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VOLUME II



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DAMAGE TOLERANCE ANALYSIS FOR MANNED HYPERVELOCITY VEHICLES

VOLUME II - SOFTWARE USER'S MANUAL

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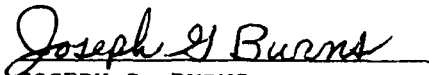
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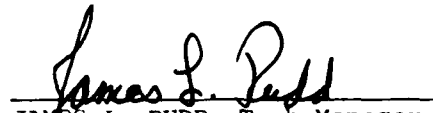
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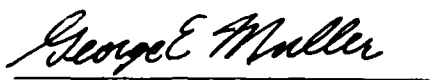
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19. ABSTRACT (Continue on reverse if necessary and identify by block number) The objective of this program was to provide a fracture mechanics based life prediction procedure for hypersonic airframe structures subjected to combined mechanical loadings and thermal profiles. Existing routines were used along with element test data to develop this procedure. The accuracy of the procedure was determined by predicting the crack growth under thermomechanical load histories typical of advanced fighters and aerospace vehicles, and then comparing those predictions with test results. Limitations in the ability of this procedure to predict the test results were used to formulate recommendations for further modeling efforts and research. A fracture mechanics based life prediction procedure was developed for hypersonic airframes subjected to thermomechanical load profiles. The analysis that was developed models crack growth behavior in metals, accounts for the effects of temperature on yield strength and fracture toughness, and includes the effects of sustained loads at elevated temperature on crack growth rate. The analysis was incorporated into a computer (cont'd)					
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routine named DAMAGE. Predictions made with the DAMAGE routine were within 20 percent of the test lives for 67 percent of the combined thermomechanical load history tests performed.

FOREWORD

This report was prepared by McDonnell Aircraft Company (MCAIR), St. Louis, Missouri, for the Structural Integrity Branch, Structures Division, Flight Dynamics Laboratory, Wright Research and Development Center, Wright-Patterson Air Force Base, Ohio under contract F33615-86-C-3208, Project 2401, Work Unit, 24010199, "Damage Tolerance Analysis for Manned Hypervelocity Vehicles." The contract monitor is Joseph G. Burns, WRDC/FIBEC. The period of performance for this contract was September 1986 through September 1989.

The Structural Research Department of McDonnell Aircraft Company was responsible for the performance of this program. The Program Manager was Charles R. Saff. Principal Investigator and principal author of this report was David M. Harmon.

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SECTION I

INTRODUCTION

Implementation of the Air Force structural integrity philosophy as defined in MIL-STD-1530A requires efficient, accurate, and cost effective prediction of crack growth behavior under complex combinations of mechanical loading and chemical/thermal environments. Current Air Force airframe structural life predictions are based on isothermal analyses because the times at high temperatures are short and have little effect on life prediction. At most, a "worst case" temperature is selected for limited testing and allowables generation for high temperature areas of the structure.

In the aircraft engine industry, life analyses emphasize other factors. The engine environment dictates that temperature, load frequency, and stress ratio effects be modeled accurately, while the mechanical load interaction effects are either ignored or simplified. Temperature variations are much more accurately modeled in analyses and testing for engine environments than for airframes.

The ever-increasing mission requirements for Air Force hypervelocity and high Mach number aircraft accentuate the importance of the temperature environment to the structures engineer. Tests have shown that the thermal-mechanical load profiles experienced by such vehicles can produce lives considerably shorter than those predicted by "worst case" isothermal test data and analyses.

A fracture mechanics based life prediction procedure for hypersonic airframe structures subjected to combined mechanical loadings and thermal profiles has been developed and programmed. Existing routines and element test data helped to develop this procedure. The accuracy of the procedure was determined by predicting the crack growth under thermomechanical load histories typical of advanced fighters and advanced aerospace vehicles, and comparing those predictions with test results.

SECTION II

PROGRAM SUMMARY

1. Program Objective - A method has been developed for the fatigue life prediction of metals subjected to combined mechanical and thermal loads. This analysis has been incorporated into a computer program called "Damage Analysis of Metals subjected to AGgresive Environments" (DAMAGE). Volume I of this report documents the analytical procedures as well as the model development and verification test data for the contract (Reference 1). Volume II is the software user's manual. DAMAGE is an extension of a computer program known as CRKGRO which was developed by Rockwell International under an Air Force contract (Reference 2) for room temperature spectrum fatigue analysis.

The baseline fatigue crack growth rate equations in DAMAGE are the Modified Walker and Chang equations with a variable threshold stress intensity factor range. Load interaction effects are accounted for through the use of the Generalized Willenborg model for tensile overloads and the Chang acceleration scheme for compressive underloads.

The DAMAGE program includes the following capabilities for elevated temperature analysis: 1) a temperature dependent Walker equation for fitting crack growth data; 2) a Wei-Landes method for sustained load crack growth; 3) Larson-Miller data which will determine the effective yield strength based on time at temperature; 4) a method which accounts for a reduction in yield strength with temperature; 5) a method for predicting the effects of temperature on fracture toughness; and 6) a temperature dependent overload shut-off ratio for calculating retardation effects caused by overloads. DAMAGE will analyze crack growth in specimens with part-through or through cracks emanating from open holes or slots. Specimens may be subjected to axial loads and/or out-of-plane bending moments.

DAMAGE was made extremely user-friendly for the interactive user. Error traps were incorporated into the code to prevent premature termination of an analysis session. The user is prompted for revised data whenever input data

is found to be erroneous. The code is fully commented and streamlined to make the baseline code and the addition more easily deciphered.

In addition, an interactive plotting routine has been incorporated into DAMAGE. This routine will generate a low resolution plot on any terminal, such that a quick graphical reference can be made of the output data. This data is also stored in output data files, so that it can be plotted on any in-house high resolution plotting routine.

2. Technical Discussion - The purpose of this contract was to use relatively simple methods to analyze elevated temperature crack growth. These methods were programmed and added to the room temperature analysis routines in CRKGRO. The resulting program is called DAMAGE.

The methods described in this section have been used by various investigators to model specific characteristics of crack growth behavior. In this contract, these methods were consolidated into one crack growth analysis scheme. The flow chart for the analysis program is presented in Figure 1.

a. Crack Growth Rate Model - The baseline fatigue crack growth rate equation in CRKGRO is the modified Walker equation for positive stress ratios, and the Chang equation for negative stress ratios:

for $R \geq 0$ and $\Delta K > \Delta K_{th}$

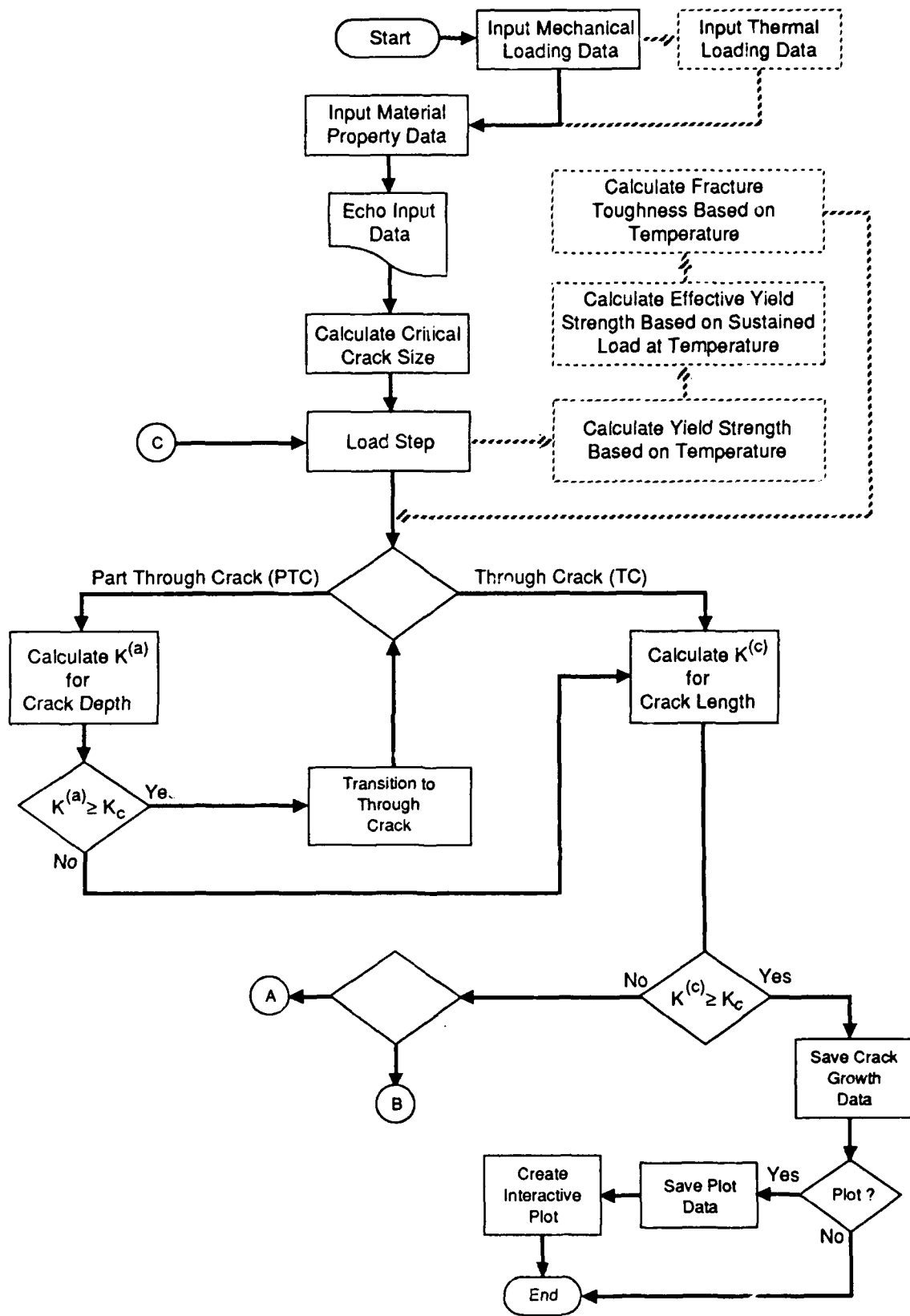
$$dc/dN = C [\Delta K (1-R)^{M-1}]^N = C [(1-R)^M K_{max}]^N$$

for $R < 0$ and $\Delta K > \Delta K_{th}$

$$dc/dN = C [(1+R^2)^Q K_{max}]^N$$

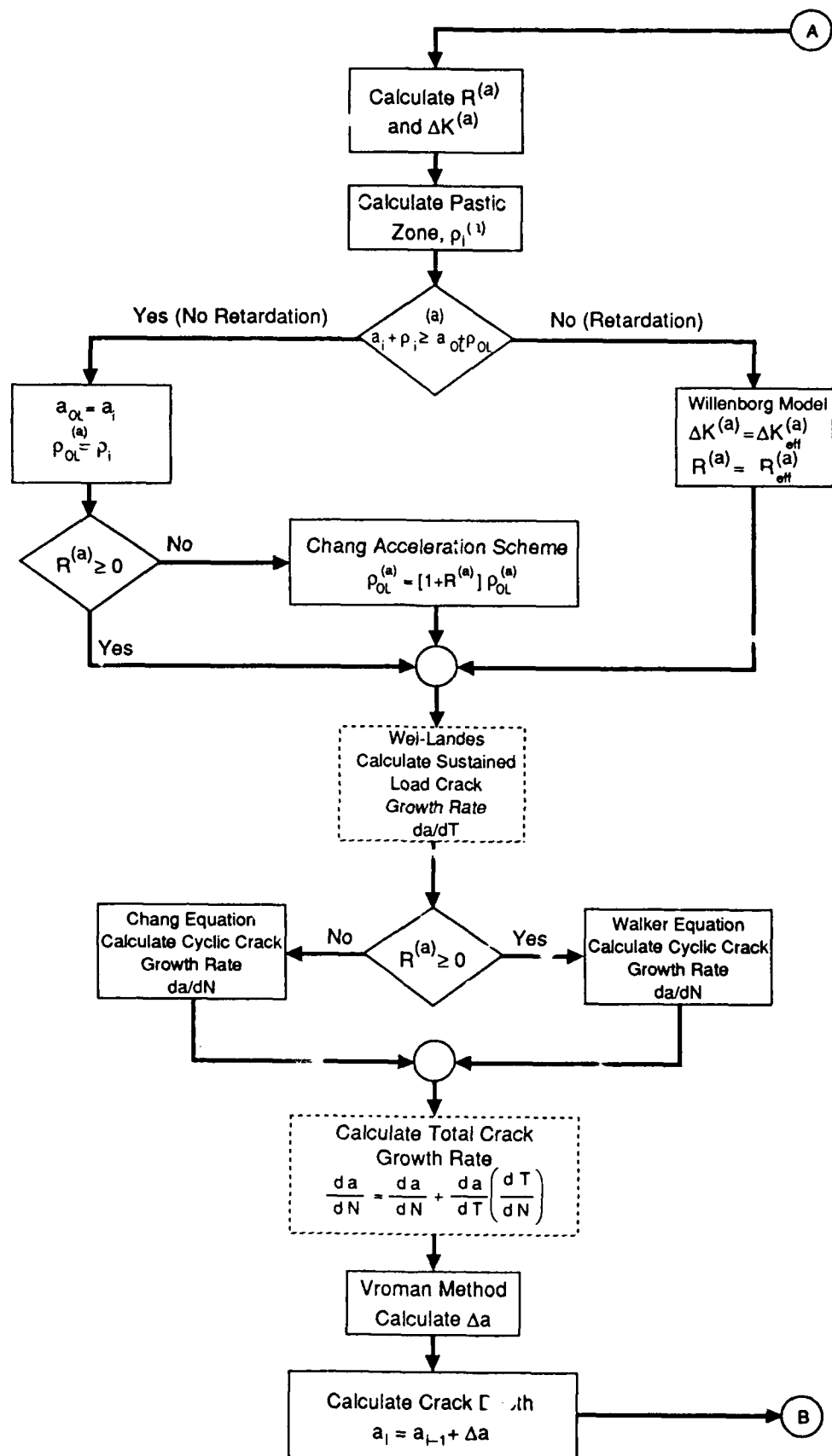
for $\Delta K \leq \Delta K_{th}$

$$dc/dN = 0$$



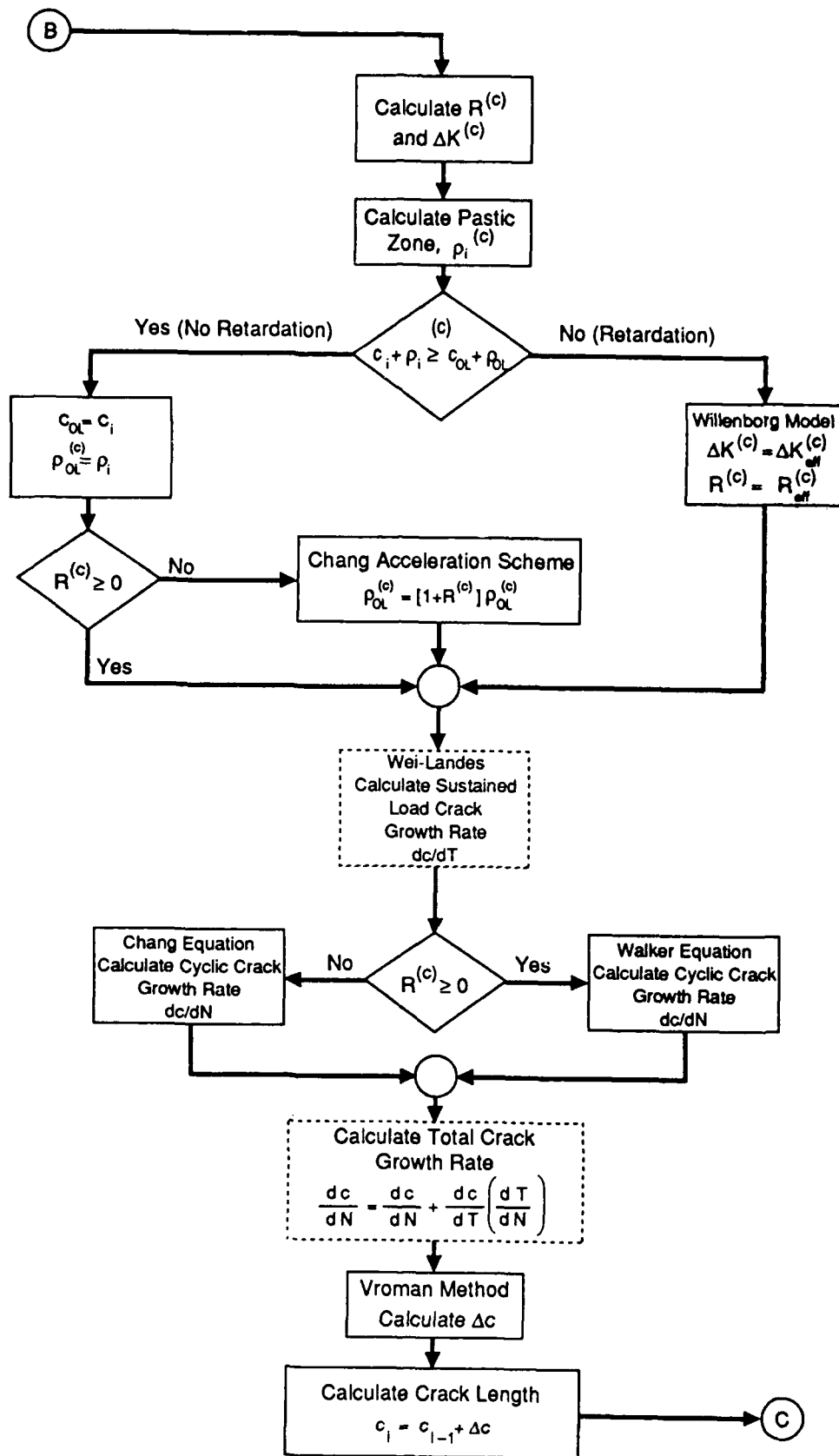
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Figure 1. CRKGRO/DAMAGE Flow Chart



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Figure 1. (Cont.) CRKGRO/DAMAGE Flow Chart



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Figure 1. (Concluded) CRKGRO/DAMAGE Flow Chart

where C and N are growth rate constants, and M and Q are stress ratio empirical exponents. The values of C, N, M, and Q are determined within DAMAGE. The user must supply the crack growth rate data. Data may be input for any number of stress ratios and for up to three different temperatures (including room temperature).

The constants C and N are determined from R=0 test data. When R=0, the above equations reduce to:

$$dc/dN = C K_{\max}^N$$

The equation for a line is found when the log of both sides is calculated:

$$\log(dc/dN) = \log(C) + N \log(K_{\max})$$

A least squares fit is then used to determine the values of C and N.

Data for positive stress ratios, R>0, is used to determine M. An expression for M is found by taking the ratio of the dc/dN equation for R>0 with the dc/dN equation for R=0.

$$\frac{dc/dN_{R>0}}{dc/dN_{R=0}} = \zeta = \frac{C [(1.0-R)^M K_{\max}]^N}{C K_{\max}^N} = (1.0-R)^{M N}$$

The equation for M is determined by taking the log of both sides of the above equation.

$$M = \frac{\sum_{i=1}^{npt} \log(\zeta_i) / [N \log(1.0-R)]}{1}$$

where npt = number of dc/dN vs. ΔK data points for $R > 0$ curves.

A similar equation for Q is determined using the same procedure. In this case, however, only data from negative stress ratio ($R < 0$) tests are used. The expression for Q is:

$$Q = \frac{\sum_{i=1}^{npt} \log(\zeta_i)}{[N \log(1.0 + R^2)]}$$

The Modified Walker and Chang equations only allow for linear curve fits of crack growth rate data. However, if the dc/dN vs. ΔK data is partitioned, it is possible to obtain a bi-linear curve fit. In this case, the user must provide the approximate location of the transition point. The routine will use this point to partition the crack growth rate data. Once the expressions for the upper and lower crack growth curve have been calculated, the actual transition point will be determined and used within the program.

To account for the effects of elevated temperatures, the routine requires crack growth data at room temperature and at either one or two elevated temperatures. Each set of data is fit using the Modified Walker and Chang equations, such that values of C, M, N, and Q are determined for each temperature. Given a value of ΔK , the crack growth rate, dc/dN, is calculated for each temperature. If data for only two temperatures is provided, then the actual dc/dN for a specified temperature is calculated by interpolating between the room and maximum temperature dc/dN values. If data for three temperatures is provided, a quadratic curve is fit to the dc/dN data.

The threshold value of ΔK is determined by the following:

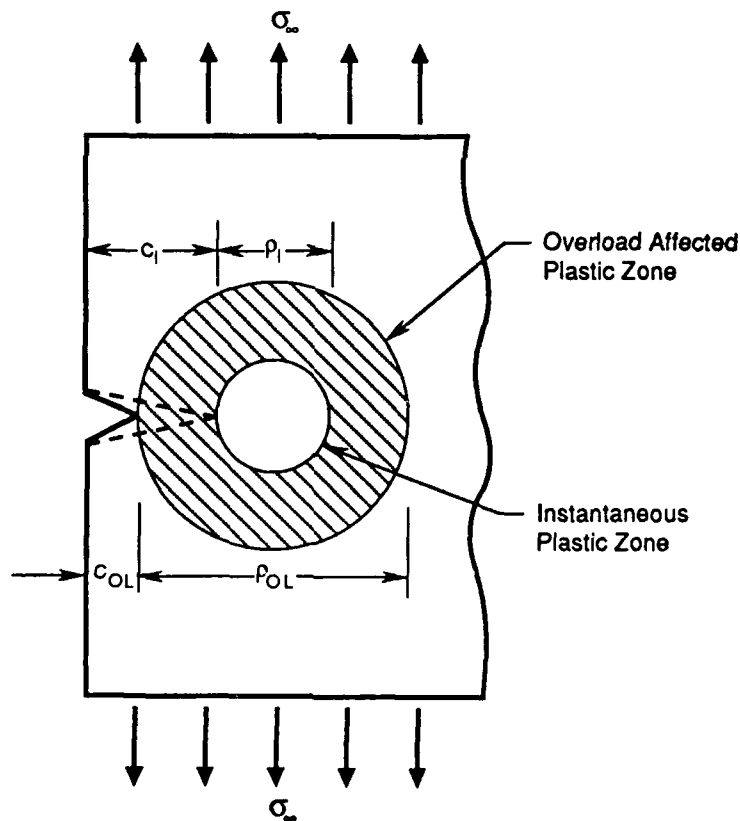
$$\Delta K_{th} = (1 - A R) \Delta K_{tho}$$

where ΔK_{tho} is the threshold value obtained from $R = 0$ constant amplitude tests. A is an empirical constant obtained from ΔK_{th} data for constant amplitude tests with various stress ratios. The value of A is solved for by rearranging the above equation and must be supplied by the user.

$$A = [(\Delta K_{th0} - \Delta K_{th}) + 1]/R$$

b. Load Interaction Model - The load interaction model in DAMAGE is the Generalized Willenborg model for tensile overloads with a reduction in overload zone size proposed by Chang for compressive underloads.

The Willenborg model (Reference 3) is used to predict crack growth retardation due to overload cycles in the load spectrum. Figure 2 presents a drawing of a crack immediately following an overload. The crack length is c_{01} and the plastic zone created by the overload is ρ_{01} . The crack length associated with a load cycle following the overload is represented by c_i . Similarly, the instantaneous plastic zone associated with the same load cycle is designated as ρ_i .



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Figure 2. Plastic Zone at Crack Tip

The underlying principle of the Willenborg model is that crack growth retardation will occur after an overload as long as $c_i + \rho_i < c_{01} + \rho_{01}$. These sums are defined as the instantaneous interaction zone, z_i , and the overload interaction zone, z_{01} , respectively. To accommodate this idea, the model calculates an effective stress intensity, ΔK_{eff} , and an effective stress ratio, R_{eff} , to calculate the crack growth rate.

The Generalized Willenborg model (Reference 4) predicts that crack growth is shut-off when $K_{eff-max}$ equals the maximum threshold stress intensity of the material, K_{th-max} . The expressions for the effective stress intensities are:

$$K_{eff-max} = K_{\infty max} - \phi [K_{01-max} (1 - \Delta c/\rho_{01})^{1/2} - K_{\infty max}]$$

$$K_{eff-min} = K_{\infty min} - \phi [K_{01-max} (1 - \Delta c/\rho_{01})^{1/2} - K_{\infty max}]$$

where

$$\phi = (1 - K_{th-max}/K_{\infty max})/(R_{SO} - 1)$$

and

$$R_{SO} = K_{01-max}/K_{\infty max}$$

The overload shut-off ratio, R_{SO} , is obtained from test data. A good method for obtaining R_{SO} is to fit crack growth data from baseline isothermal spectrum load fatigue tests. This method was used in this contract and is described in Volume I, Section V-5c.

The effective stress intensity, ΔK_{eff} , is calculated using the standard fracture mechanics formula:

$$\Delta K_{eff} = K_{eff-max} - K_{eff-min} = K_{\infty max} - K_{\infty min} = \Delta K$$

The effective stress ratio is calculated as:

$$R_{eff} = K_{eff-min}/K_{eff-max}$$

The Willenborg model reduces the stress ratio below the applied stress, but does not change the stress intensity range. The model will retard crack growth until the current load interaction zone extends to the end of the overload interaction zone.

The reduction of the overload retardation effect caused by a compressive underload is accounted for through the "effective overload interaction zone" concept proposed by Chang (Reference 2). In this model, the plastic zone size is modified to be:

$$\rho_{\text{eff}} = (1 + R_{\text{eff}}) \rho$$

where R_{eff} is the negative effective stress ratio ($R_{\text{eff}} \leq 0$).

In DAMAGE, the plane strain plastic zone equation is used at the depth of a part-through crack. The user has the option of using plane strain or plane stress plastic zone size equations in the length direction to analyze through cracks and part-through cracks. The plane stress and plane strain plastic zone size equations for any load cycle are:

$$\rho = [\gamma/(2\pi)] (K_{\infty\text{max}}/F_{\text{ty}})^2$$

where

$$\gamma = 1 - \text{plane stress}$$

$$\gamma = 1/3 - \text{plane strain}$$

F_{ty} is the material tensile yield strength and $K_{\infty\text{max}}$ is the maximum applied stress intensity factor.

c. Temperature Effects on Material Properties - Material properties change with temperature. DAMAGE will account for changes in yield strength, fracture toughness, and overload shut-off ratio. In each case, DAMAGE accepts input files which contain temperature vs. percent reduction of the material property data.

Yield Strength - The yield strength will be reduced due to temperature, resulting in a larger plastic zone in front of the crack tip. The crack growth rate is reduced as long as the crack length does not exceed the plastic zone. Therefore, if the plastic zone size increases, the crack growth rate is reduced for a longer period of time.

Fracture Toughness - The fracture toughness of a material will generally improve with increased temperatures. The net effect is that the crack will grow longer before failure because the critical crack length will increase. However, when the crack is in the vicinity of the critical crack size, the crack growth rate is rapid. As a result, it will not take many cycles for the crack to grow to the point where the critical crack length and the fracture toughness are exceeded. Therefore, the change in fracture toughness should have a minimal effect on life predictions.

Overload Shut-Off Ratio - The generalized Willenborg model accounts for the ability of high spectrum loads to retard the crack growth produced by subsequent low loads. This retardation is accounted for by using the overload shut-off ratio, R_{SO} , which is defined as:

$$R_{SO} = K_{O1-max}/K_{\infty max}$$

This ratio determines the magnitude of the overload required to shut-off crack growth completely for subsequent load cycles. A high R_{SO} value would indicate that the material is insensitive to overloads. Conversely, a low R_{SO} would indicate that the predicted crack growth is retarded after an overload and would result in a longer predicted life.

Values for the overload shut-off ratio, R_{SO} , are determined by correlation with isothermal spectrum load fatigue test results. These tests must be performed at room and elevated temperatures since R_{SO} will change with temperature.

d. Environmental Considerations - The Wei-Landes approach for environmental acceleration of crack growth was incorporated into DAMAGE (Reference 5). This method accounts for the effect of time at load upon crack growth.

It uses the crack growth rate data for R=0 tests at high and low frequencies to determine dc/dt for a given temperature.

The Wei-Landes method of predicting elevated temperature crack growth, separates the crack growth due to mechanical load cycling from that due to sustained loads. It is assumed that the total crack growth is the sum of these two terms.

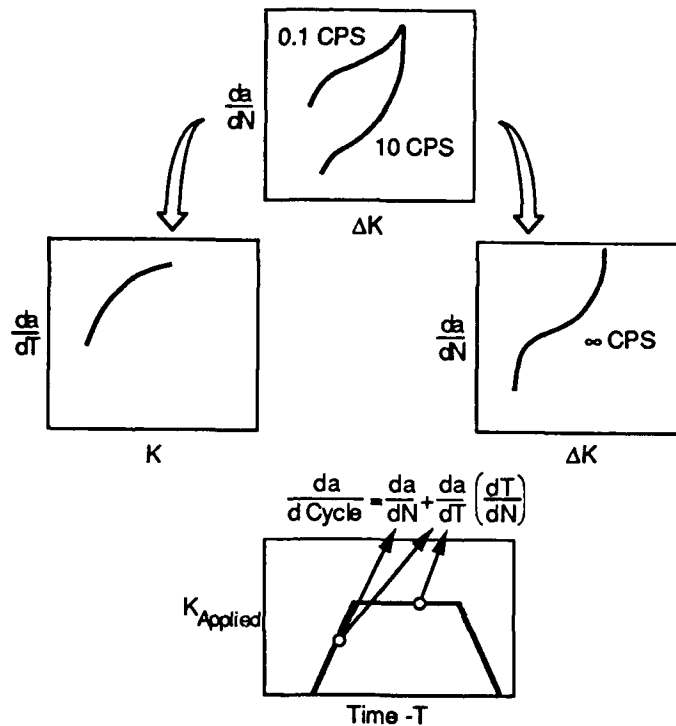
$$dc/dN = dc/dN_C + dc/dN_S$$

Mechanical load crack growth is measured in terms of length per cycle, dc/dN . Sustained load crack growth is measured in terms of length per time, dc/dt . The cyclic crack growth rate is determined using the Modified Walker equation as discussed in an earlier section.

Figure 3 demonstrates how the Wei-Landes model determines dc/dt from the differences between high and low frequency crack growth rate data. In this figure, 10 Hz is the high frequency and 0.10 Hz is the low frequency. It is assumed that hold time has little or no effect on crack growth rate at the 10 Hz frequency. Thus the difference between the crack growth rates of cycles having the 10 second hold times (0.10 Hz) and those having no hold times (10 Hz) is used to determine dc/dt for each test temperature. The dc/dt versus K_{max} curves for each temperature are integrated as a function of stress intensity factor to determine the cracking due to sustained loads during (1) loading, (2) hold at maximum load, and (3) unloading.

To use the Wei-Landes method in DAMAGE, two crack growth curves must be supplied: one obtained from a high frequency test and one from a low frequency test. An optimum curve for the low frequency data would have the same loading speed as the high frequency data, but with a hold time at peak load that equals the maximum hold time expected in service.

e. Creep Crack Growth - A major concern in elevated temperature crack growth in metals is creep. Creep will blunt the crack tip, and therefore reduce the crack growth rate.



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Figure 3. Wei - Landes Method

The crack growth model incorporated into DAMAGE accounts for creep by modeling the plastic zone in front of the crack tip as shown in Figure 4. The plastic zone size increases when yield strength is reduced at high temperatures. This zone is also affected by increased plasticity with hold time at temperature (creep). The plastic zone size is calculated as follows:

$$\rho = [\gamma/(2\pi)] (K_{\max}/F_{ty})^2$$

where

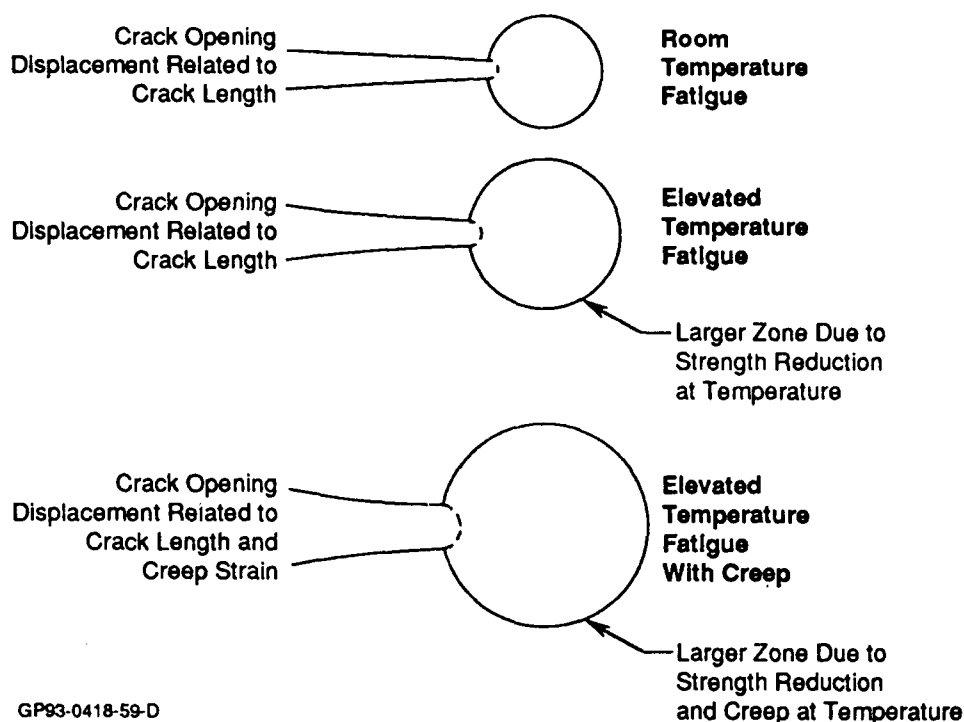
$\gamma = 1$ - plane stress

$\gamma = 1/3$ - plane strain

and

F_{ty} = material yield strength.

The plastic zone size is inversely proportional to the material yield strength.



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Figure 4. Effect of Temperature and Sustained Loads on Plastic Zone Size

Creep is introduced into this model through the effective yield strength, F_{ef-ty} . The effective yield strength is defined as the stress level required to produce 0.2 percent strain in a material at a given temperature and hold time. The effective yield strength is calculated at each load cycle, and is used to determine the plastic zone size. As the temperature and hold time increase, the effective yield strength decreases and the plastic zone size increases. Crack growth is retarded as long as the current plastic zone is smaller than the previous one.

DAMAGE allows the use of Larson-Miller data to determine the effective yield strength of the material given a temperature and hold time. A typical Larson-Miller plot is shown for 6Al-2Sn-4Zr-2Mo titanium in Figure 5. The effective yield strength and the temperature and hold time parameter, P , must be input.

$$P = (460 + T)(P_{1m} + \log(t_h)) 10^{-3}$$

where T is the temperature in degrees Fahrenheit, t_h is the hold time in hours, and P_{1m} is a material constant used to fit the data.

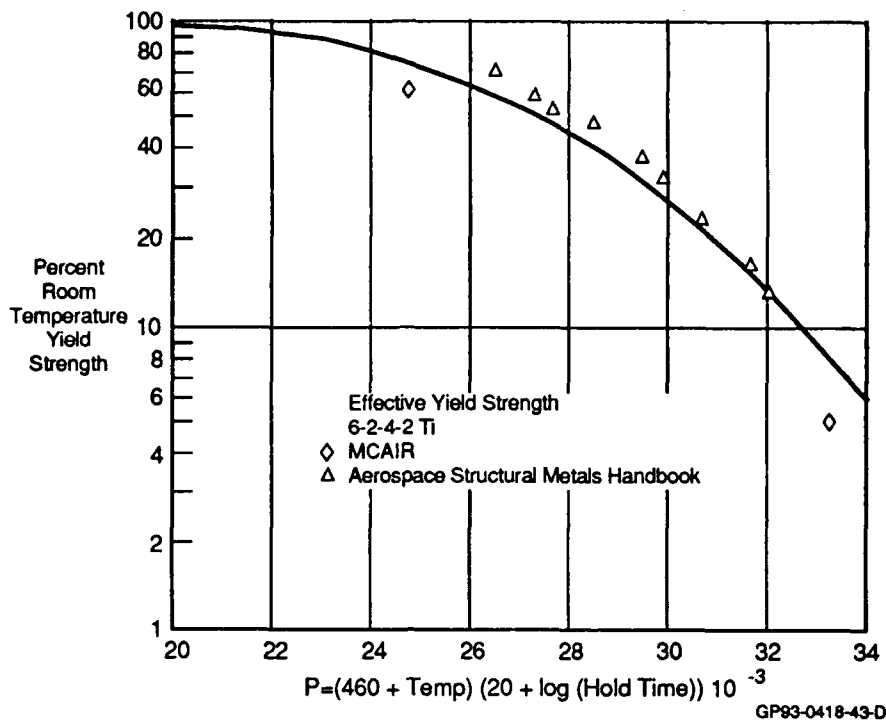


Figure 5. Larson - Miller Plot for 6-2-4-2 Ti

f. Damage Accumulation Technique - Damage accumulation in DAMAGE is based on the Vroman Linear approximation method. In this method, the crack growth for a given stress step is assumed to be 1 percent of the current crack length. The stress steps are input by the user and consist of a number of constant amplitude cycles, N , in which the stress varies from the maximum stress in the cycle, σ_{\max} , to the minimum stress in the cycle, σ_{\min} .

For a given stress step, the crack growth rate, dc/dN , is calculated using the Walker equation. The crack growth for the step is assumed to be $\Delta c = 0.01c$, where "c" is the instantaneous crack length. The number of cycles in the stress step, N , is then compared to the actual number of cycles required to achieve the assumed crack growth:

$$N_{\text{act}} = 0.01 c / (dc/dN)$$

If $N_{\text{act}} > N$, then

$$\Delta c_{\text{act}} = N dc/dN$$

$$c = c + \Delta c_{act}$$

The analysis then proceeds to the next stress step.

If $N_{act} \leq N$, then

$$\Delta c_{act} = \Delta c = 0.01 c$$

$$c = c + \Delta c$$

One must then examine the remaining cycles in this stress step, $N_{rem} = N - N_{act}$. The procedure described above is repeated until all of the cycles in the step have been examined. At that point, the analysis proceeds to the next stress step.

g. Geometric Capabilities - An extensive library of stress intensity factor solutions is available in DAMAGE (Figure 6). The crack library module consists of ten subroutines, each containing one stress intensity solution. For part-through cracks, shape change is predicted based on the assumption that growth in the two directions can be characterized by the stress intensities at the extreme points. Compound solutions expressed in polynomial form are typically used in these routines to summarize the effects of width, thickness, crack depth, crack length, and crack aspect ratio on stress intensity.

CRKGRO contains stress intensity solutions for plates loaded axially in tension. In DAMAGE, these solutions were updated and new solutions were added for plates subject to axial tension and/or out-of-plane bending moments. Stress intensity solutions were obtained from three sources: 1) Newman and Raju; 2) Tada, Paris and Irwin; and 3) Rooke and Cartwright (References 6 through 9). In these solutions, stress intensity factors are determined separately for tension and bending. The total stress intensity is then the sum of the two solutions.

$$K = (\sigma_t \beta_t + \sigma_b \beta_b) (\pi c)^{1/2}$$




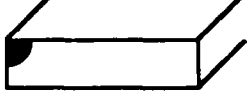



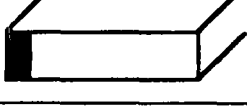

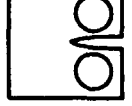
where "c" is the crack length, σ_t and σ_b are the tension and bending stresses, and β_t and β_b are the tension and bending geometry factors. The bending stress, σ_b , is determined from the out-of-plane bending moment, M, and is calculated as:

$$\sigma_b = M a_0 / I$$

where I is the moment of inertia. For a rectangular cross-section of width, W, and thickness, t, I is equal to $(W t^3 / 12)$. a_0 is the distance between the mid-plane of the plate and the location where the bending stress is calculated. At the specimen surface, $a_0 = t/2$ and the bending stress is

$$\sigma_b = 6 M / (W t^2)$$

Appendix A identifies each specimen geometry and the appropriate stress intensity factor solutions for plates subject to tension and/or bending. An additional subroutine was added to DAMAGE which allows the user to supply stress intensity factor data for specific cases not covered in the solution library. This data file must contain crack length vs. geometry factor data, β . Data may be provided for specimens loaded in tension and/or subject to out-of-plane bending.

Code No.	Description	Geometry
1010	Center Surface Crack	
1020	One Corner Crack from Center Open Hole	
1030	Two Corner Cracks from Center Open Hole	
1040	One Corner Edge Crack	
2010	Center Crack	
2020	One Crack from Center Open Hole	
2030	Two Cracks from Center Open Hole	
2040	One Edge Crack	
2050	Two Edge Crack	
2060	ASTM Compact Tension Specimen	

GP93-0418-122-D

Figure 6. Stress Intensity Factor Solutions
DAMAGE

SECTION III

DAMAGE DESCRIPTION

1. Input Data - DAMAGE is designed to be a quick and easy to use computer program that can be run in interactive or batch mode. The program runs from data that can either be input interactively or read from a specified file. Once the data has been input, the user may review the data and edit it as necessary. After successful execution, the program will write the input data to a file if requested.

The echo/edit routine is used to modify an existing set of data. Once the data has been read into the program or entered interactively, the user is asked if editing is desired. If this option is selected, the user is presented with a menu which lists the analysis modules for which data may be edited. The editing process starts with an echoing of the input data for that section of analysis. The user is asked if this data is correct. If it is correct, the routine exits to the first menu. If the data is incorrect, the user may modify any or all of the data listed. The editing routine also allows addition of data sets for analysis modules not originally selected. Similarly, the user may eliminate an analysis option, or add or delete material systems.

a. Error Trapping - The routine has error traps to assist the user when answering questions interactively. These error traps are designed to catch simple typographical errors. Without these error traps, the program would stop and would have to be re-run from the start. Another type of error trap included in the routine checks a numeric response when choosing from a list of numbered options. If your entry does not appear in the given list, then the program will ask you to try again.

b. Data Description - In this section, a list of the input data and a description of each input variable is provided. An input file may be created from the following list of data, however it is easier to enter the data interactively and then store that data in a file prior to program execution.

Problem Title

HDNG - maximum of 70 characters

Material Properties

MATID - material title card, maximum of 60 characters

Room Temperature Crack Growth Rate Data

NBISL(1) - 0 single slope curve fit of dc/dN vs. ΔK

1 - bi-slope curve fit of dc/dN vs. ΔK

MATDAT(1) - name of file containing dc/dN vs. ΔK data

for high frequency tests with different R's

ATLEV(1) - approximate value of dc/dN where transition from lower region curve fit to upper region fit occurs, (in/cycle)

TRANSL(1) - approximate value of ΔK where transition from lower region curve fit to upper region fit occurs,
(ksi*sqrt(in))

CKC - plane stress fracture toughness, K_C (ksi*sqrt(in)), used for through crack instability criteria on half-crack length 'c' (room temperature)

AKIC - plane strain fracture toughness, K_{IC} (ksi*sqrt(in)), used for part-through crack instability criteria on crack depth 'a' (room temperature)

SIGMAY - material yield strength (ksi)

VV - material poisson ratio

DELKTH - the threshold of ΔK (ksi*sqrt(in)), for $R = 0$ test below which the growth rate is set to zero.

THA - threshold constant, used in definition of variable threshold = $\Delta K_{th} (1 - THA \text{ ABS}(R))$

RCUT - the value of the positive stress ratio, R , above which the material does not show accelerated growth rate.

RCUTN - the value of the negative stress ratio, R , below which the material does not show retarded growth rate.

ATP - Are elevated temperature effects accounted for when calculating crack growth? (y/n)

```

if ATP = y
  Elevated Temperature Crack Growth Rate Data
  (nn = 1 - room temperature (data input above),
  nn = 2 - intermediate temperature,
  nn = 3 - maximum temperature)
  for NN = 2, 3
    NBISL(NN) - 0 - single slope curve fit of  $dc/dN$  vs.  $\Delta K$ 
               1 - bi-slope curve fit of  $dc/dN$  vs.  $\Delta K$ 
    MATDAT(NN) - name of file containing  $dc/dN$  vs.  $\Delta K$  data for high
                  frequency tests with different R's
    ATLEV(NN) - approximate value of  $dc/dN$  where transition from lower
                  region curve fit to upper region fit occurs (in/cycle)
    TRANSL(NN) - approximate value of  $\Delta K$  where transition from lower
                  region curve fit to upper region fit occurs
                  (ksi*sqrt(in))
  AWL - Are sustained loads accounted for when calculating crack growth?
        (y/n)
  if AWL = y
    Wei-Landes Data
    FNS - name of file containing  $dc/dN$  vs.  $\Delta K$  data from a low frequency
          test
    FNF - name of file containing  $dc/dN$  vs.  $\Delta K$  data from a high frequency
          test
    RWL - stress ratio for input data
    TWL - temperature for this data (degrees Fahrenheit)
  ALM - Are elevated temperatures and sustained loads to be accounted for
        when calculating yield strength? (y/n)
  if ALM = y
    Larson-Miller Data
    FNT - name of file containing temperature vs. yield strength and
          fracture toughness
    FNC - name of file containing Larson-Miller parameters vs. yield
          strength (accounts for load, hold time, and temp)

```

Geometry Data

RETTYP - y - Willenborg retardation model used
n - no load interaction
b - analyses is given for both load interaction and no load interaction

RETDA - load interaction shut-off ratio for crack arrest, or overload shut-off ratio

if ATP = y or ALM = y
FNR - name of file containing temperature vs. overload shut-off ratio data

CODE - crack codes
part-through crack types
1010 - center surface crack
1020 - one corner crack from centered open hole
1030 - two corner cracks from centered open hole
1040 - one corner edge crack
through crack types
2010 - center crack
2020 - one crack from centered open hole
2030 - two cracks from centered open hole
2040 - one edge crack
2050 - two edge cracks
2060 - ASTM standard compact tension (ct) specimen
2070 - user defined stress intensity factor

if CODE = 2070
FILECB - stress intensity data file

WIDTH - width of specimen (in)

T - thickness of specimen (in)

RADIUS - radius of open hole (in)

if CODE = 1010, 1020, 1030, or 1040
NBRK - 0 - transition occurs when crack = thickness
1 - transition occurs before crack = thickness

AINIT - initial crack depth (in)

AF1 - final crack depth (in)
0 - critical crack depth

CINIT - initial crack length (in)
DF1 - final crack length (in)
 0 - critical crack length
IPS - 0 - plane stress condition is used for crack length
 1 - plane strain condition is used for crack length
 (plane strain condition is used for crack depth)

Loading Data

NLIM - number of applied test stress levels and/or applied
 out-of-plane bending moments
 maximum # is 6
 if RETTYP = b (both retarded and unretarded crack growth is
 computed), then maximum # is 3
SIGLIM(1-6) - applied limit stress (ksi)
MOMENT(1-6) - out-of-plane bending moment (kip-in) Bending stresses due
 to out-of-plane bending moments will be calculated and
 added to the peak and valley axial stresses. The analysis
 assumes the following:
 1) The moments are applied such that the bending stresses
 are completely reversible ($R=-1.0$).
 2) The loading and moment frequencies are the same.
TITLE - base spectrum title (maximum of 70 characters)
NRP - flag for range pairing each spectrum segment
 (Note: A range paired load spectrum is one in which peak and
 valley loads are re-paired such that the highest peak is paired
 with the lowest valley, and so on. Typically, this results in a
 more conservative life estimate.)
 0 - no range pair
 1 - range pair
 (NRP = 0 when doing elevated temp analysis)
ANSP - do you want to use an input file for the spectrum data? (y/n)
if ANSP = y
 FILEINS - spectrum input file name
if ANSP = n
 for I = 1, 20 (I - mission segment number)

```

ISPEC(I) - flight spectrum segment type
    1 - maximum stress - minimum stress
    2 - stress ratio - delta stress
    3 - mean stress - alternating stress
    4 - end
if ISPEC(I) = 1, 2 or 3
    SEGTL(I) - flight segment description (maximum of 70 characters)
    if ATP = n and ALM = n
        if ISPEC(I) = 1
             $\sigma_{\max}$  (ksi),  $\sigma_{\min}$  (ksi), cycles
            - maximum stress, minimum stress, # of cycles
            (enter this data for each load step)
        if ISEC(I) = 2
             $\Delta\sigma$  (ksi), R, cycles
            - delta stress, stress ratio, # of cycles
            (enter this data for each load step)
        if ISEC(I) = 3
             $\sigma_{\text{mean}}$  (ksi),  $\sigma_{\text{alt}}$  (ksi), cycles
            - mean stress, alternating stress, # of cycles
            (enter this data for each load step)
        0 0 0 - signifies end of load step input for this
            segment (I)
    if ATP = y or ALM = y
        if ISPEC(I) = 1
             $\sigma_{\max}$  (ksi),  $\sigma_{\min}$  (ksi), cycles, Temp ( $^{\circ}\text{F}$ ),
             $t_c$  (sec),  $t_h$  (sec),  $t_{h_v}$  (sec),  $t_{h_z}$  (sec)
            - maximum stress, minimum stress, # of cycles, temperature,
            cycle time, hold time at maximum stress level, hold time at
            minimum stress level, hold time at 0 stress
            (enter this data for each load step)
        if ISPEC(I) = 2
             $\Delta\sigma$  (ksi), R, cycles, Temp ( $^{\circ}\text{F}$ ),  $t_c$  (sec),
             $t_h$  (sec),  $t_{h_v}$  (sec),  $t_{h_z}$  (sec)
            - delta stress, stress ratio, # of cycles, temperature, cycle
            time, hold time at maximum stress level, hold time at
            minimum stress level, hold time at 0 stress
            (enter this data for each load step)

```


if ISPEC(I) = 3

σ_{mean} (ksi), σ_{alt} (ksi), cycles, Temp ($^{\circ}\text{F}$),

t_c (sec), t_{hp} (sec), t_{hv} (sec), t_{hz} (sec)

- mean stress, alternating stress, # of cycles, temperature,
cycle time, hold time at maximum stress level, hold time at
minimum stress level, hold time at 0 stress
(enter this data for each load step)

0 0 0 0 0 0 0 0 - signifies end of load step input
for this segment (I)

Mission Mix Data

$$\text{Example: Mission} = \text{NBLKS} * \sum_{I=1}^{\text{NMIX}} \text{MISMIX}(1,I) * \text{MISMIX}(2,I)$$

NBLKS = # of times the complete mission string is repeated

NMIX = # of mission segments to be summed

for I = 1, NMIX

MISMIX(1,I) = # of times individual mission is repeated

MISMIX(2,I) = mission segment number

Output Options

ICFH - 1 - print output in cycles

2 - print output in flights

3 - print output in hours

NFPB - number of cycles (or flights or hours) per block

ANE1 - Should spectrum be printed in the output? (y/n)

NB - print crack growth history data in increments of NB cycles (or
flights or hours)

ANE2 - Is plotting required? (y/n)

if ANE2 = y

ANE3(1) - Do you want to plot \dot{c} vs. N? (y/n)

ANE3(2) - Do you want to plot dc/dN vs. N? (y/n)

ANE3(3) - Do you want to plot dc/dN vs. c ? (y/n)
 ANE3(4) - Do you want to plot dc/dN vs. K_{max} ? (y/n)
 for I = 1, 4
 if ANE3(I) = y
 SCALE(1,I) - linear or log grid for x axis
 SCALE(2,I) - linear or log grid for y axis
 0 - linear
 1 - log

c. Format for Material and Loading Data Files - There are several material data files which must be included in the input file. These data files describe: 1) crack growth at various temperatures, 2) sustained load effects on crack growth, 3) the effects of temperature on yield strength, fracture toughness, and overload shut-off ratio, 4) the effect of temperature and hold time at load on the effective yield strength, and 5) a user defined stress intensity field. The data file names must not be longer than 10 characters. The format for these files is described below.

MATDAT(1) - room temperature crack growth data
 MATDAT(2) - intermediate crack growth data
 MATDAT(3) - maximum temperature crack growth data

Three separate data files must be created, each with the following format:

line 1) title (maximum of 70 characters)
 line 2) number of points, stress ratio,
 temperature (°F)
 line 3) ΔK_i (ksi*sqrt(in)), dc/dN_i (in/cycle) - for $i = 1$, number
 of points

This format is repeated in each temperature file for any additional data run at different stress ratios. The first set of data in the file must be from an $R=0$ (or at least no higher than $R=0.1$) test.

FNS - low frequency crack growth data (Wei-Landes method)
 FNF - high frequency crack growth data (Wei-Landes method)

Two separate data files are required with the following format:

- line 1) title (maximum of 70 characters)
- line 2) number of points, total cycle time (sec), hold time at maximum load (sec)
- line 3) ΔK_i (ksi*sqrt(in)), dc/dN_i (in/cycle) - for $i = 1$, number of points

FNT - temperature effects on yield strength and fracture toughness data file format:

- line 1) title (maximum of 70 characters)
- line 2) number of points
- line 3) temperature (°F), % room temperature yield strength, % room temperature fracture toughness
- line 4) . , . , . - for $i = 1$, number of points

FNC - temperature and hold time effects on the effective yield strength (creep model - Larson-Miller data) format:

- line 1) title (maximum of 70 characters)
- line 2) number of points, Larson-Miller coefficient
- line 3) Larson-Miller parameter, % room temperature yield strength,
- line 4) . , . , . - for $i = 1$, number of points

Note: Larson-Miller parameter, $P = (460 + T)(P_{lm} + \log(t_h)) 10^{-3}$

T is the temperature in degrees Fahrenheit, t_h is the hold time in hours, and P_{lm} is the Larson-Miller coefficient which is a material property.

FNR - temperature effect on overload shut-off ratio data file format:

- line 1) title (maximum of 70 characters)
- line 2) number of points
- line 3) temperature (°F), % room temperature overload shut-off ratio
- line 4) . , . , . - for $i = 1$, number of points

FILECB - user defined stress intensity factor data format:

- line 1) title (maximum of 70 characters)
- line 2) number of points
- line 3) crack length (in), geometry factor (β)
- line 4) . , . , . - for $i = 1$, number of points

Note: The stress intensity factor is defined as:

$$K = (\sigma_t \beta_t + \sigma_b \beta_b) (\pi c)^{1/2}$$

Two sets of data must be included in this file. The first set is for a plate loaded in tension and the second set for a plate subject to out-of-plane bending moments. If only one set of data is provided, then the number of points for the other set must be set equal to zero.

The load (and temperature) spectrum can be placed directly in the main input file as described in the previous section. However, this data may also be kept in a separate file, *FILEINS*, if desired. The format for this file is exactly the same as shown in the input data description when *ANSP* = *n*.

2. Output Results - The user has the option of running *DAMAGE* in interactive or batch mode. Either way, during program execution the output is written to a file called *DAMAGE.DAT* in the user's directory. The output is displayed on the screen during an interactive session. The output is displayed in four sections: 1) data echo, 2) critical crack length data, 3) crack growth data, and 4) plots. The output displayed and the files created by each module are described in this section.

a. Data Echo - All of the input data is echoed in the first part of the output data file. This allows a visual check of the input data. The data is listed along with a brief description of each variable. The user also has the option of printing the equations used for calculating the stress intensity factors in the output file. In addition, the load and temperature data file will be displayed if desired. This is especially convenient when the load spectrum has been ranged paired.

b. Critical Crack Length - The critical crack length (and depth for panels with part-through thickness flaws) is based on the peak stress in the load spectrum and the fracture toughness of the material. The program uses an iterative procedure in which the fracture toughness is calculated based on an initial guess for the critical crack length. This guess is then increased or decreased depending on whether the calculated fracture toughness is greater than or less than the actual material fracture toughness. The iterative procedure is complete when the error in the calculated fracture toughness is less than 1.0 percent.

Temperature affects the material fracture toughness, and therefore, the critical crack length. The critical crack length is recalculated for each temperature input in the fracture toughness data.

The output file (DAMAGE.DAT) identifies the maximum axial and bending stress in the load spectrum. Then, at each temperature, the following items are listed: 1) the critical crack length, 2) the calculated fracture toughness, and 3) the number of iterations required to achieve less than a 1.0 percent error. Panels with part-through thickness flaws also list the same information for the critical crack length as well as similar information for the critical crack depth.

c. Crack Growth Data - Crack length (and depth for panels with part-through thickness flaws) is printed at intervals specified by the user. Life can be expressed in terms of cycles, flights, or hours. The maximum stress intensity factor and the crack growth rate are also supplied at each interval. The crack growth rate is expressed in terms of inches/cycle.

d. Plotting Capabilities - DAMAGE also contains a subroutine for producing low resolution plots on any terminal. Therefore a quick graphical reference can be made for the output crack growth data. Four types of plots can be made: 1) crack length vs. life, 2) crack growth rate vs. life, 3) crack growth rate vs. crack length, and 4) crack growth rate vs. maximum stress intensity. These plots are applicable for part-through and through thickness flaws. Four additional plots describing the crack depth are also

available for panels with part-through thickness flaws. The x and y axes can be plotted on a linear or logarithmic scale as specified by the user.

A maximum of six curves (one for each stress level) may be plotted per graph. The plot legend identifies the stress level with the appropriate curve symbol. Next to each stress level, an "R" or a "U" will appear, indicating whether the solution included load retardation (R) effects due to overloads or if the solution was unretarded (U).

The data generated by the plotting module are also written to data files in a format which allows for plotting using higher resolution routines. All of the output files are written to the user's directory during execution. The data file names are PLOT*.DT, where the * will be 1 through 8 for the 8 different plots available.

SECTION IV

EXAMPLE PROBLEMS

Data may be input into the program interactively or using input files. If the data is input interactively, the program will store the data in an input file, if the user desires.

Four different example problems are listed in this section to demonstrate the input file format and to display some sample output. The data in the input files must appear on the appropriate lines as shown, but the column spacing in each row is arbitrary. If there is an error in the input file, the program will terminate execution. Therefore, the simplest way to create an input file is to enter the data interactively and let the program create and save the input file for later use.

Material data and spectrum load data files specified in the input files below are listed in Appendices B, C, and D.

Example 1. Room Temperature, Constant Amplitude Load

Material: Inconel 718

Specimen Type: Center Cracked Tension - Through Thickness

Load Profile: Constant Amplitude, $R=0.02$

Temperature Profile: Constant Temperature, 78°F

Input File

Model Development

IN-718

0

IN718RT2 (Appendix B)

0.0000000E+00

0.0000000E+00

120.00000

120.00000

164.0000

0.29

11.0000

0.2620

1.250000

-0.200

N

N

N

Y

2.40

2010

3.000000

0.1870000

0.0000000E+00

0.410

0.0000000E+00

0

1

15.84

0.00

Constant Amplitude

0

N

1

$R = 0.02$

1.00 0.020 100.0

1.00 0.020 100.0

1.00 0.020 100.0

1.00	0.020	100.0
1.00	0.020	100.0
1.00	0.020	100.0
1.00	0.020	100.0
1.00	0.020	100.0
1.00	0.020	100.0
1.00	0.020	100.0
1.00	0.020	100.0

0 0 0

4

1000

1

1

1

1

1000

N

10000

Y

Y

N

N

Y

O

O

1

1

Output File

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

CRACK CODE: 2010 --- THROUGH CRACK, CENTERED
LOAD INTERACTION: WILLENBORG-CHANG
DAMAGE ACCUMULATION: VROMAN (LINEAR APPRX.)
CRACK GROWTH RATE EQ.: MODIFIED WALKER

MATERIAL: IN-718

ROOM TEMPERATURE CRACK GROWTH RATE DATA
DC/DN VS DELTA K MATERIAL FILE - IN718RT2
TEMPERATURE = 78.000
WALKER EQUATION VARIABLES

GROWTH RATE EQ. CONST. C = 2.2556E-12
GROWTH RATE EQ. EXP. N = 4.280
GROWTH RATE EQ. EXP. M = 0.596
GROWTH RATE EX. EXP. Q = 1.009

ROOM TEMPERATURE FRACTURE TOUGHNESS - PLANE STRAIN = 120.000
ROOM TEMPERATURE FRACTURE TOUGHNESS - PLANE STRESS = 120.00
ROOM TEMPERATURE YIELD STRENGTH = 164.000 KSI
POISSON RATIO = 0.29
DELTA KTH = $(1 - 0.3 \cdot \text{ABS}(R)) \cdot 11.000$
+R CUT-OFF = 1.250
-R CUT-OFF = -0.200
HALF PLATE WIDTH (B) = 1.500 INCH
PLATE THICKNESS (T) = 0.187 INCH
INITIAL HALF CRACK LENGTH (C) = 0.410 INCH
FINAL HALF CRACK LENGTH (C) = 0.000 INCH
PLANE STRESS PROBLEM
M I S S I O N M I X

MAXIMUM NUMBER OF LOAD BLOCKS = 1000
THE LOADING SPECTRUM HAS 1 MISSION(S)
DESIGN LIMIT STRESS
15.840 KSI
OUT-OF-PLANE BENDING MOMENT
0.000 KIP-IN

***** END OF INPUT *****

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

ESTIMATION OF THE CRITICAL CRACK LENGTH
BASED ON KLIMIT AND CONSTANT ASPECT RATIO

MAXIMUM STRESS = DESIGN LIMIT STRESS * MAXIMUM PEAK IN SPECTRUM
MAXIMUM AXIAL STRESS = 15.840 * 1.000 = 15.84 KSI
MAXIMUM BENDING STRESS = 0.00 KSI

TEMP	CRACK LENGTH	STRESS INTENSITY	ITERATION
------	-----------------	---------------------	-----------

78.0	1.425	120.00	14
------	-------	--------	----

CRITICAL CRACK SIZE ESTIMATE COMPLETED

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

ANALYSIS IS DONE WITH LOAD INTERACTION.
CRACK GROWTH SUMMARY TABLE FOR EVERY 10000 LOAD CYCLES
INITIAL CRACK LENGTH WAS C = 0.4100 IN
DESIGN LIMIT STRESS = 15.84 KSI
BENDING MOMENT = 0.00 KIP-IN

LOAD CYCLES	LENGTH	KMAX	DC/DN
-----	-----	----	-----
10000.	0.4163	19.03	6.407E-07
20000.	0.4228	19.21	6.670E-07
30000.	0.4296	19.39	6.953E-07
40000.	0.4367	19.59	7.257E-07
50000.	0.4442	19.79	7.586E-07
60000.	0.4519	20.01	7.942E-07
70000.	0.4601	20.23	8.329E-07
80000.	0.4686	20.46	8.751E-07
90000.	0.4776	20.71	9.214E-07
100000.	0.4870	20.97	9.722E-07
110000.	0.4970	21.25	1.028E-06
120000.	0.5076	21.55	1.091E-06
130000.	0.5189	21.86	1.160E-06
140000.	0.5309	22.20	1.239E-06
150000.	0.5437	22.56	1.328E-06
160000.	0.5575	22.95	1.429E-06
170000.	0.5724	23.38	1.546E-06
180000.	0.5885	23.84	1.682E-06
190000.	0.6061	24.36	1.843E-06
200000.	0.6255	24.93	2.037E-06
210000.	0.6470	25.58	2.275E-06
220000.	0.6712	26.33	2.573E-06
230000.	0.6988	27.21	2.959E-06
240000.	0.7309	28.26	3.482E-06
250000.	0.7692	29.59	4.232E-06
260000.	0.8170	31.34	5.410E-06
270000.	0.8808	33.90	7.568E-06
280000.	0.9789	38.56	1.308E-05
290000.	1.2831	67.02	1.226E-04
290491.	1.4385	132.76	1.643E-03

CRACK GROWTH ANALYSIS COMPLETE
CRITICAL STRESS INTENSITY EXCEEDED - KC = 120.00
MAXIMUM CRACK LENGTH EXCEEDED - CF = 1.4254
TOTAL TEST TIME = 0.0 HOURS
AVERAGE TEST TEMPERATURE = 78.0

FINAL CRACK SIZE WAS REACHED
IN BLOCK 291 STEP 4
WITH C = 1.439
CRACK GROWTH HISTORY COMPLETED

*** P L O T S U M M A R Y ***

Model Development

PLOT 1 LINEAR

CRACK LENGTH, IN VS

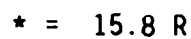
LOAD CYCLES

PLOT 2 LOG-LOG

LENGTH/CYCLE VS

KMAX, KSI*SQRT(IN)

* = 15.8 R



Example 2. Room Temperature, Spectrum Load

Material: 6-2-4-2 Titanium

Specimen Type: Center Cracked Tension - Part-Through Thickness

Load Profile: Spectrum Load, Aerospace Vehicle

Temperature Profile: Constant Temperature, 78⁰F

Input File

Model Development

Ti-6-2-4-2

1

TI6242RT2 (Appendix B)

2.0000000E-06

15.00000

60.00000

60.00000

139.6000

0.32

9.000000

0.8800000

1.250000

-0.3000

N

N

N

Y

2.00

1010

3.000000

0.1870000

0.0000000E+00

0

0.1000

0.0000000E+00

0.3015

0.0000000E+00

0

1

35.00

0.00

Aerospace Vehicle Load Spectrum

0

Y

APTI (Appendix D)

1000

1

1

1

3

50
N
100
N

Output File

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

CRACK CODE: 1010 --- SURFACE CRACK, CENTERED
LOAD INTERACTION: WILLENBORG-CHANG
DAMAGE ACCUMULATION: VROMAN (LINEAR APPRX.)
CRACK GROWTH RATE EQ.: MODIFIED WALKER

MATERIAL: Ti-6-2-4-2

ROOM TEMPERATURE CRACK GROWTH RATE DATA
DC/DN VS DELTA K MATERIAL FILE - ti6242RT2
TEMPERATURE = 78.000
WALKER EQUATION VARIABLES

REGION I
GROWTH RATE EQ. CONST. C = 1.1493E-12
GROWTH RATE EQ. EXP. N = 5.566
GROWTH RATE EQ. EXP. M = 0.529
GROWTH RATE EX. EXP. Q = 1.000

REGION II
GROWTH RATE EQ. CONST. C = 1.0593E-11
GROWTH RATE EQ. EXP. N = 4.689
GROWTH RATE EQ. EXP. M = 0.618
GROWTH RATE EX. EXP. Q = 1.982

REGION I - REGION II TRANSITION AT DC/DN = 1.5334E-06
DELTA K = 12.605

ROOM TEMPERATURE FRACTURE TOUGHNESS - PLANE STRAIN = 60.000
ROOM TEMPERATURE FRACTURE TOUGHNESS - PLANE STRESS = 60.00
ROOM TEMPERATURE YIELD STRENGTH = 139.600 KSI
POISSON RATIO = 0.32
DELTA KTH = (1 - 0.9*ABS(R))* 9.000
+R CUT-OFF = 1.250
-R CUT-OFF = -0.300
HALF PLATE WIDTH (B) = 1.500 INCH
PLATE THICKNESS (T) = 0.187 INCH
INITIAL HALF CRACK LENGTH (C) = 0.301 INCH
INITIAL CRACK DEPTH (A) = 0.100 INCH
FINAL HALF CRACK LENGTH (C) = 0.000 INCH
FINAL CRACK DEPTH (A) = 0.000 INCH

A/C RATIO = 0.332
PLANE STRESS PROBLEM
MISSION MIX

MAXIMUM NUMBER OF LOAD BLOCKS = 1000
THE LOADING SPECTRUM HAS 1 MISSION(S)
DESIGN LIMIT STRESS
35.000 KSI
OUT-OF-PLANE BENDING MOMENT
0.000 KIP-IN

***** END OF INPUT *****

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

ESTIMATION OF THE CRITICAL CRACK LENGTH
BASED ON KLIMIT AND CONSTANT ASPECT RATIO

MAXIMUM STRESS = DESIGN LIMIT STRESS * MAXIMUM PEAK IN SPECTRUM

MAXIMUM AXIAL STRESS = 35.000 * 1.000 = 35.00 KSI

MAXIMUM BENDING STRESS = 0.00 KSI

TEMP	CRACK DEPTH	STRESS INTENSITY	ITERATION	CRACK LENGTH	STRESS INTENSITY	ITERATION
78.0	0.187	45.38	2	0.697	60.01	13

CRITICAL CRACK SIZE ESTIMATE COMPLETED

D A M A G E

DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

ANALYSIS IS DONE WITH LOAD INTERACTION.
 CRACK GROWTH SUMMARY TABLE FOR EVERY 100 FLIGHT HOURS
 INITIAL CRACK DEPTH WAS A = 0.1000 IN
 INITIAL CRACK LENGTH WAS C = 0.3015 IN
 DESIGN LIMIT STRESS = 35.00 KSI
 BENDING MOMENT = 0.00 KIP-IN

FLIGHT HOURS	LENGTH	KMAX	DC/DN	DEPTH	KMAX	DA/DN
100.	0.3019	12.67	8.157E-07	0.1033	18.03	1.061E-05
200.	0.3023	13.11	9.652E-07	0.1069	18.33	1.153E-05
300.	0.3028	13.59	1.153E-06	0.1109	18.64	1.254E-05
400.	0.3035	14.10	1.390E-06	0.1151	18.96	1.367E-05
500.	0.3042	14.65	2.511E-06	0.1197	19.28	1.492E-05
600.	0.3053	15.25	3.098E-06	0.1247	19.61	1.631E-05
700.	0.3068	15.89	3.743E-06	0.1302	19.95	1.782E-05
800.	0.3086	16.58	4.565E-06	0.1361	20.29	1.946E-05
900.	0.3107	17.31	5.606E-06	0.1425	20.62	2.109E-05
1000.	0.3133	18.08	6.929E-06	0.1493	20.94	2.272E-05
1100.	0.3165	18.89	8.637E-06	0.1567	21.24	2.435E-05
1200.	0.3204	19.72	1.083E-05	0.1646	21.51	2.592E-05
1300.	0.3252	20.57	1.359E-05	0.1730	21.75	2.738E-05
1400.	0.3309	21.42	1.699E-05	0.1819	21.95	2.863E-05

TRANSITION TO THRU CRACK

MAXIMUM CRACK DEPTH EXCEEDED - AF = 0.1868

1500.	0.3425	16.96	2.085E-06
1600.	0.3624	17.52	2.436E-06
1700.	0.3869	18.19	2.924E-06
1800.	0.4169	19.02	3.629E-06
1900.	0.4553	20.07	4.735E-06
2000.	0.5076	21.52	6.624E-06
2100.	0.5874	23.78	1.085E-05
2200.	0.7590	29.19	3.085E-05
2203.	0.7695	65.39	3.276E-05

CRACK GROWTH ANALYSIS COMPLETE

CRITICAL STRESS INTENSITY EXCEEDED - KC = 60.00

MAXIMUM CRACK LENGTH EXCEEDED - CF = 0.6972

TOTAL TEST TIME = 0.0 HOURS

AVERAGE TEST TEMPERATURE = 78.0

FINAL CRACK SIZE WAS REACHED

IN BLOCK 45 STEP 76

WITH C = 0.769

CRACK GROWTH HISTORY COMPLETED

Example 3. Elevated Temperature, Constant Amplitude Load

Material: Inconel 718

Specimen Type: Center Cracked Tension - Through-Thickness

Load Profile: Constant Amplitude, $R=-0.20$, 30 Second Hold
Times at Peak Load

Temperature Profile: Constant Temperature, 1200°F

Input File

Model Development

IN-718

0

IN718RT2 (Appendix B)

0.0000000E+00

0.0000000E+00

120.00000

120.00000

164.0000

0.29

12.20000

0.2620

1.250000

-0.200

Y

0

IN718700B (Appendix B)

0.0

0.0

0

IN718TP (Appendix B)

0.0

0.0

N

Y

DAMINYDKC (Appendix B)

DAMINEFYD (Appendix B)

y

2.400

DAMINRSO (Appendix B)

2010

3.000000

0.1870000

0.0000000E+00

0.903

0.0000000E+00

0

1

19.443

0.00

Constant Amplitude

0
N
1
R = -0.20
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
1.00 -0.20 10.0 1200.0 31.25 30.0
0 0 0 0 0 0 0 0
4
1000
1
1
1
1
100
Y
100
N

Output File

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

CRACK CODE: 2010 --- THROUGH CRACK, CENTERED
LOAD INTERACTION: WILLENBORG-CHANG
DAMAGE ACCUMULATION: VROMAN (LINEAR APPRX.)
CRACK GROWTH RATE EQ.: MODIFIED WALKER
TEMP EFFECTS ON YIELD STRENGTH: LARSON-MILLER DATA
TEMP EFFECTS ON FRACTURE TOUGHNESS: TEST DATA
NO RANGE PAIR COUNTING ALLOWED WHEN APPLYING ELEVATED TEMPERATURES

MATERIAL: IN-718

ROOM TEMPERATURE CRACK GROWTH RATE DATA
DC/DN VS DELTA K MATERIAL FILE - IN718RT2
TEMPERATURE = 78.000
WALKER EQUATION VARIABLES

GROWTH RATE EQ. CONST. C = 2.2556E-12
GROWTH RATE EQ. EXP. N = 4.280
GROWTH RATE EQ. EXP. M = 0.596
GROWTH RATE EX. EXP. Q = 1.009

ROOM TEMPERATURE FRACTURE TOUGHNESS - PLANE STRAIN = 120.000
ROOM TEMPERATURE FRACTURE TOUGHNESS - PLANE STRESS = 120.000
ROOM TEMPERATURE YIELD STRENGTH = 164.000 KSI
POISSON RATIO = 0.29
DELTA KTH = $(1 - 0.3 \cdot \text{ABS}(R)) \cdot 12.200$
+R CUT-OFF = 1.250
-R CUT-OFF = -0.200

MATERIAL: IN-718

INTERMEDIATE TEMPERATURE CRACK GROWTH RATE DATA

DC/DN VS DELTA K MATERIAL FILE - in718700B

TEMPERATURE = 700.000

WALKER EQUATION VARIABLES

GROWTH RATE EQ. CONST. C = 6.8572E-11

GROWTH RATE EQ. EXP. N = 3.269

GROWTH RATE EQ. EXP. M = 1.000

GROWTH RATE EX. EXP. Q = 1.000

MATERIAL: IN-718

MAXIMUM TEMPERATURE CRACK GROWTH RATE DATA

DC/DN VS DELTA K MATERIAL FILE - in718tp

TEMPERATURE = 1200.000

WALKER EQUATION VARIABLES

GROWTH RATE EQ. CONST. C = 1.4059E-09

GROWTH RATE EQ. EXP. N = 2.855

GROWTH RATE EQ. EXP. M = 0.941

GROWTH RATE EX. EXP. Q = 1.000

TEMPERATURE VS YIELD STRENGTH AND KC DATA FILE - daminydkc

TEMPERATURE AND HOLD TIME VS EFF YIELD STR FILE - daminefyd

HALF PLATE WIDTH (B) = 1.500 INCH

PLATE THICKNESS (T) = 0.187 INCH

INITIAL HALF CRACK LENGTH (C) = 0.903 INCH

FINAL HALF CRACK LENGTH (C) = 0.000 INCH

PLANE STRESS PROBLEM

M I S S I O N M I X

MAXIMUM NUMBER OF LOAD BLOCKS = 1000

THE LOADING SPECTRUM HAS 1 MISSION(S)

DESIGN LIMIT STRESS

19.443 KSI

OUT-OF-PLANE BENDING MOMENT

0.000 KIP-IN

SPECTRUM FOR SEGMENT 1
R = -0.20

STEP #	MAX. STR	MIN. STR	CYCLES	TEMP	LOAD CY TIME	HOLD TM @ PEAK	HOLD TM @ VALL	HOLD TM @ ZERO
1	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
2	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
3	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
4	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
5	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
6	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
7	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
8	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
9	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0
10	1.00	-0.20	10.	1200.	31.3	30.0	0.0	0.0

***** END OF INPUT *****

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

ESTIMATION OF THE CRITICAL CRACK LENGTH
BASED ON KLIMIT AND CONSTANT ASPECT RATIO

MAXIMUM STRESS = DESIGN LIMIT STRESS * MAXIMUM PEAK IN SPECTRUM
MAXIMUM AXIAL STRESS = 19.443 * 1.000 = 19.44 KSI
MAXIMUM BENDING STRESS = 0.00 KSI

TEMP	CRACK LENGTH	STRESS INTENSITY	ITERATION
78.0	1.390	120.04	11
200.0	1.392	121.25	13
400.0	1.396	123.60	8
600.0	1.400	125.97	14
800.0	1.403	128.38	14
1000.0	1.408	132.01	14
1200.0	1.411	134.40	11
1400.0	1.414	136.79	12
1600.0	1.417	139.18	14

CRITICAL CRACK SIZE ESTIMATE COMPLETED

D A M A G E

DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Model Development

ANALYSIS IS DONE WITH LOAD INTERACTION.
 CRACK GROWTH SUMMARY TABLE FOR EVERY 100 LOAD CYCLES
 INITIAL CRACK LENGTH WAS C = 0.9030 IN
 DESIGN LIMIT STRESS = 19.44 KSI
 BENDING MOMENT = 0.00 KIP-IN

LOAD CYCLES	LENGTH	KMAX	DC/DN
-----	-----	-----	-----
100.	0.9102	43.21	7.335E-05
200.	0.9177	43.62	7.538E-05
300.	0.9253	44.06	7.754E-05
400.	0.9332	44.52	7.985E-05
500.	0.9413	44.99	8.231E-05
600.	0.9497	45.50	8.496E-05
700.	0.9584	46.03	8.780E-05
800.	0.9673	46.59	9.087E-05
900.	0.9766	47.18	9.419E-05
1000.	0.9862	47.81	9.780E-05
1100.	0.9962	48.48	1.017E-04
1200.	1.0066	49.19	1.061E-04
1300.	1.0175	49.96	1.108E-04
1400.	1.0288	50.79	1.161E-04
1500.	1.0408	51.69	1.221E-04
1600.	1.0533	52.67	1.288E-04
1700.	1.0666	53.75	1.364E-04
1800.	1.0807	54.95	1.452E-04
1900.	1.0958	56.29	1.554E-04
2000.	1.1120	57.81	1.675E-04
2100.	1.1295	59.55	1.822E-04
2200.	1.1487	61.59	2.003E-04
2300.	1.1700	64.04	2.235E-04
2400.	1.1940	67.09	2.546E-04
2500.	1.2217	71.06	2.989E-04
2600.	1.2551	76.67	3.688E-04
2700.	1.2985	85.80	5.010E-04
2800.	1.3657	107.58	8.990E-04
2839.	1.4139	136.53	1.563E-03

CRACK GROWTH ANALYSIS COMPLETE
 CRITICAL STRESS INTENSITY EXCEEDED - KC = 134.40
 MAXIMUM CRACK LENGTH EXCEEDED - CF = 1.4113
 TOTAL TEST TIME = 24.7 HOURS
 AVERAGE TEST TEMPERATURE = 1200.0

FINAL CRACK SIZE WAS REACHED
IN BLOCK 29 STEP 3
WITH C = 1.414
CRACK GROWTH HISTORY COMPLETED

Example 4. Spectrum Temperature, Spectrum Load -

Material: 6-2-4-2 Titanium

Specimen Type: Open Hole Tension - Through-Thickness

Load Profile: Spectrum Load, Advanced Fighter,

Time Compression Factor = 100

Temperature Profile: Spectrum Temperature,

Maximum Temperature = 1000°F

Input File

Verification Prediction

Ti-6-2-4-2

1

TI6242RT2 (Appendix B)

2.0E-6

15.0

60.00000

60.00000

139.6000

0.32

9.000000

0.8800000

1.250000

-0.300

Y

1

TI6242700 (Appendix B)

1.0E-5

25.0

0

TI6242TP (Appendix B)

0.0000000E+00

0.0000000E+00

Y

DAMTISLOW (Appendix B)

DAMTIFAST (Appendix B)

2.0000000E-02

1000.000

Y

DAMTIYDKC (Appendix B)

DAMTIEFYD (Appendix B)

Y

2.00

DAMTIRSO (Appendix B)

2030

3.000000

0.1870000

0.1250000

0.350
0.0000000E+00
0
1
29.00000
0.00
Full Advanced Fighter Spectrum
0
y
AF100 (Appendix C)
1000
1
1
1
3
100
N
100
Y
Y
N
N
N
0
0

Output File

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Verification Prediction

CRACK CODE: 2030 --- TWO THROUGH CRACKS FROM CENTERED OPEN HOLE
LOAD INTERACTION: WILLENBORG-CHANG
DAMAGE ACCUMULATION: VROMAN (LINEAR APPRX.)
CRACK GROWTH RATE EQ.: MODIFIED WALKER
SUSTAINED LOAD EFFECTS: WEI-LANDES
TEMP EFFECTS ON YIELD STRENGTH: LARSON-MILLER DATA
TEMP EFFECTS ON FRACTURE TOUGHNESS: TEST DATA
NO RANGE PAIR COUNTING ALLOWED WHEN APPLYING ELEVATED TEMPERATURES

MATERIAL: Ti-6-2-4-2

ROOM TEMPERATURE CRACK GROWTH RATE DATA
DC/DN VS DELTA K MATERIAL FILE - ti6242RT2
TEMPERATURE = 78.000
WALKER EQUATION VARIABLES

REGION I
GROWTH RATE EQ. CONST. C = 1.1493E-12
GROWTH RATE EQ. EXP. N = 5.566
GROWTH RATE EQ. EXP. M = 0.529
GROWTH RATE EX. EXP. Q = 1.000

REGION II
GROWTH RATE EQ. CONST. C = 1.0593E-11
GROWTH RATE EQ. EXP. N = 4.689
GROWTH RATE EQ. EXP. M = 0.618
GROWTH RATE EX. EXP. Q = 1.982

REGION I - REGION II TRANSITION AT DC/DN = 1.5334E-06
DELTA K = 12.605

FRACTURE TOUGHNESS - PLANE STRAIN = 60.000
FRACTURE TOUGHNESS - PLANE STRESS = 60.000
ROOM TEMPERATURE YIELD STRENGTH = 139.600 KSI
POISSON RATIO = 0.32
DELTA KTH = $(1 - 0.9 \cdot \text{ABS}(R)) \cdot 9.000$
+R CUT-OFF = 1.250
-R CUT-OFF = -0.300

MATERIAL: Ti-6-2-4-2

INTERMEDIATE TEMPERATURE CRACK GROWTH RATE DATA
DC/DN VS DELTA K MATERIAL FILE - ti6242700
TEMPERATURE = 700.000
WALKER EQUATION VARIABLES

REGION I
GROWTH RATE EQ. CONST. C = 8.7287E-12
GROWTH RATE EQ. EXP. N = 4.616
GROWTH RATE EQ. EXP. M = 1.000
GROWTH RATE EX. EXP. Q = 1.000

REGION II
GROWTH RATE EQ. CONST. C = 1.4939E-10
GROWTH RATE EQ. EXP. N = 3.641
GROWTH RATE EQ. EXP. M = 1.000
GROWTH RATE EX. EXP. Q = 1.000

REGION I - REGION II TRANSITION AT DC/DN = 6.0088E-06
DELTA K = 18.394

MATERIAL: Ti-6-2-4-2

MAXIMUM TEMPERATURE CRACK GROWTH RATE DATA

DC/DN VS DELTA K MATERIAL FILE - ti6242TP

TEMPERATURE = 1000.000

WALKER EQUATION VARIABLES

GROWTH RATE EQ. CONST. C = 4.9739E-10

GROWTH RATE EQ. EXP. N = 3.409

GROWTH RATE EQ. EXP. M = 0.771

GROWTH RATE EX. EXP. Q = 1.000

HIGH FREQUENCY DC/DN VS DELTA K DATA FILE - damtifast

LOW FREQUENCY DC/DN VS DELTA K DATA FILE - damtislow

STRESS RATIO FOR THIS DATA = 0.020

TEMPERATURE FOR THIS DATA = 1000.

TEMPERATURE VS YIELD STRENGTH AND KC DATA FILE - damtiydk

TEMPERATURE AND HOLD TIME VS EFF YIELD STR FILE - damtiefyd

HALF PLATE WIDTH (B) = 1.500 INCH

PLATE THICKNESS (T) = 0.187 INCH

RADIUS OF HOLE (R) = 0.125 INCH

INITIAL HALF CRACK LENGTH (C) = 0.350 INCH

FINAL HALF CRACK LENGTH (C) = 0.000 INCH

PLANE STRESS PROBLEM

M I S S I O N M I X

MAXIMUM NUMBER OF LOAD BLOCKS = 1000

THE LOADING SPECTRUM HAS 1 MISSION(S)

DESIGN LIMIT STRESS

29.000 KSI

OUT-OF-PLANE BENDING MOMENT

0.000 KIP-IN

***** END OF INPUT *****

D A M A G E
DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Verification Prediction

ESTIMATION OF THE CRITICAL CRACK LENGTH
BASED ON KLIMIT AND CONSTANT ASPECT RATIO

MAXIMUM STRESS = DESIGN LIMIT STRESS * MAXIMUM PEAK IN SPECTRUM
MAXIMUM AXIAL STRESS = 29.000 * 1.150 = 33.35 KS
MAXIMUM BENDING STRESS = 0.00 KSI

TEMP	CRACK LENGTH	STRESS INTENSITY	ITERATION
78.0	0.642	59.99	13
200.0	0.651	60.60	12
300.0	0.667	61.80	13
400.0	0.683	63.00	13
500.0	0.699	64.19	12
600.0	0.714	65.38	10
700.0	0.729	66.59	12
800.0	0.778	70.82	10
900.0	0.828	75.61	11
1000.0	0.867	79.81	13
1200.0	0.903	83.97	12

CRITICAL CRACK SIZE ESTIMATE COMPLETED

D A M A G E

DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

Verification Prediction

ANALYSIS IS DONE WITH LOAD INTERACTION.
 CRACK GROWTH SUMMARY TABLE FOR EVERY 100 FLIGHT HOURS
 INITIAL CRACK LENGTH WAS C = 0.3500 IN
 DESIGN LIMIT STRESS = 29.00 KSI
 BENDING MOMENT = 0.00 KIP-IN

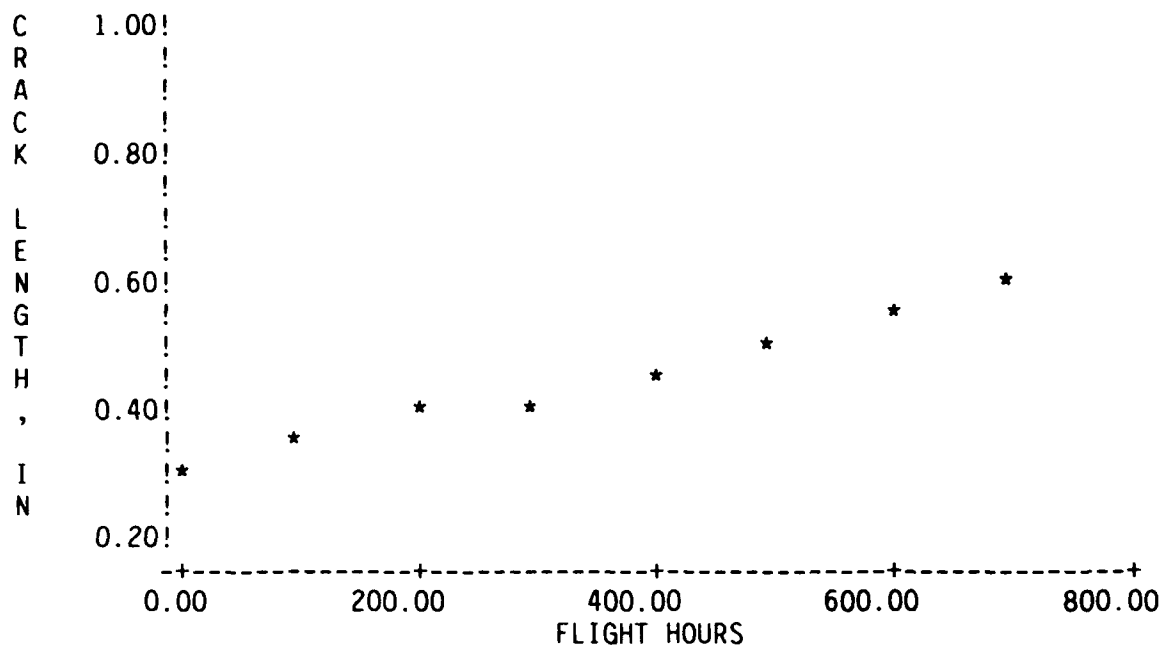
FLIGHT HOURS	LENGTH	KMAX	DC/DN
-----	-----	-----	-----
100.	0.3750	20.63	2.493E-07
200.	0.4015	21.30	2.761E-07
300.	0.4319	22.08	3.120E-07
400.	0.4674	23.02	3.633E-07
500.	0.5101	24.19	4.431E-07
600.	0.5638	25.74	5.849E-07
700.	0.6359	28.01	9.085E-07
752.	0.6741	62.31	1.134E-03

CRACK GROWTH ANALYSIS COMPLETE
 CRITICAL STRESS INTENSITY EXCEEDED - KC = 61.80
 MAXIMUM CRACK LENGTH EXCEEDED - CF = 0.6673
 TOTAL TEST TIME = 7.5 HOURS
 AVERAGE TEST TEMPERATURE = 550.2

FINAL CRACK SIZE WAS REACHED
 IN BLOCK 8 STEP 833
 WITH C = 0.674
 CRACK GROWTH HISTORY COMPLETED

D A M A G E DAMAGE ANALYSIS OF METALS SUBJECT TO AGGRESSIVE ENVIRONMENTS

* = 29.0 R



*** P L O T S U M M A R Y ***

Verification Prediction
PLOT 1 LINEAR

CRACK LENGTH, IN VS

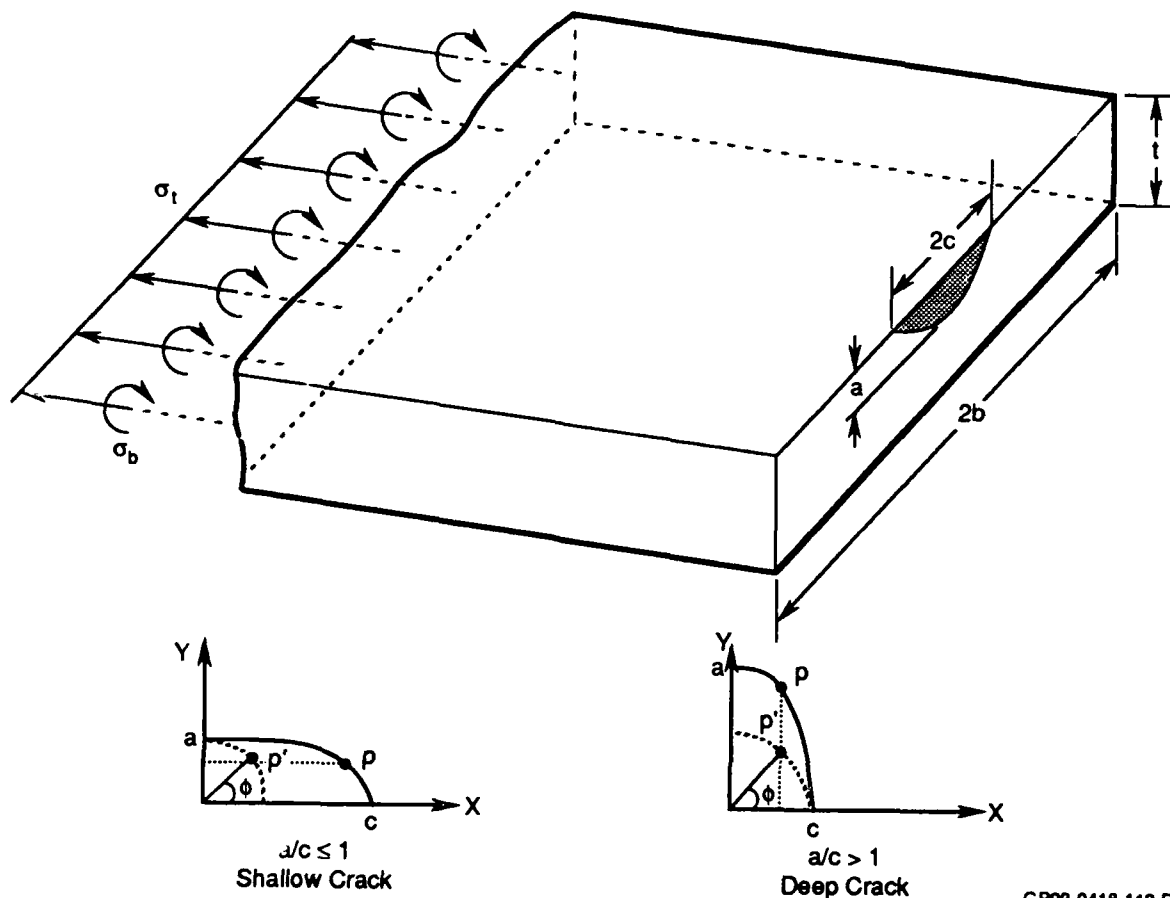
FLIGHT HOURS

REFERENCES

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2. Chang, J. B., Hiyama, R. M., and Szamossi, M., "Improved Methods for Predicting Spectrum Loading Effects - Final Report, Volume I - Technical Summary," Report No. AFWAL-TR-81-3092, November 1981.
3. Willenborg, J., Engle, R. M., and Wood, H. A., "A Crack Growth Prediction Model Using an Effective Stress Concept," Report No. AFFDL-TM-71-1-FBR, 1971.
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6. Newman, J. C. and Raju, I. S., "Stress Intensity Factor Equations for Cracks in Three Dimensional Finite Bodies Subjected to Tension and Bending Loads," NASA Tech Memorandum 85793, April 1984.
7. Newman, J. C., "Predicting Failure of Specimens With Either Surface Cracks or Corner Cracks at Holes," NASA TN D-8244, June 1976.
8. Tada, H., Paris, P., and Irwin, G., "The Stress Analysis of Cracks Handbook," Del Research, 1973.
9. Rooke, D. P. and Cartwright, D. J., "Compendium of Stress Intensity Factors," 1976.

APPENDIX A
STRESS INTENSITY FACTOR LIBRARY

Crack Code: 1010 - Center Surface Crack



GP83-0418-113-D

The angle, ϕ , represents the point along the part-through crack perimeter, P , at which the stress intensity, K , is computed.

To calculate K for the crack depth, a , $\phi = 90$
 To calculate K for the crack length, c , $\phi = 10$

The point, P , is defined using the following procedure:

- 1) A circular arc is drawn which is within the crack perimeter and which has a radius equal to " a " for a shallow crack (or " c " for a deep crack);
- 2) The point along the arc, P' , is defined by ϕ which is measured from the X axis;
- 3) A line is drawn parallel to the X axis for a shallow crack (or parallel to the Y axis for a deep crack) through P' to the crack perimeter.

Crack Code: 1010 - Center Surface Crack

Reference: Newman, J. C. and Raju, I. S., "Stress Intensity Factor Equations for Cracks in Three Dimensional Finite Bodies Subjected to Tension and Bending Loads," NASA Tech Memorandum 85793, April 1984.

$$K = K_t(\phi) + K_b(\phi)$$

t - tension, b - bending

$$K_a = K_t(\phi=90^\circ) + K_b(\phi=90^\circ)$$

$$K_c = K_t(\phi=10^\circ) + K_b(\phi=10^\circ)$$

$$K_t(\phi) = \sigma_t \sqrt{\frac{a}{\pi Q}} F \quad K_b(\phi) = \sigma_b \sqrt{\frac{a}{\pi Q}} F H$$

where

$$Q = 1 + 1.464 \left(\frac{a}{c}\right)^{1.65} \quad \text{for } \frac{a}{c} \leq 1$$

$$Q = 1 + 1.464 \left(\frac{c}{a}\right)^{1.65} \quad \text{for } \frac{a}{c} > 1$$

$$F = m g f_\phi f_w$$

$$H = H_1 + (H_2 - H_1) \sin^p \phi$$

$$f_w = \sqrt{\sec\left(\frac{\pi c}{2b} \sqrt{\frac{a}{t}}\right)}$$

for $a/c \leq 1$ (shallow crack)

$$m = (1.13 - 0.09 a/c) + \left(-0.54 + \frac{0.89}{0.2 + a/c} \right) \left(\frac{a}{t} \right)^2 \\ + \left(0.5 - \frac{1}{0.65 + a/c} + 14(1 - a/c)^{24} \right) \left(\frac{a}{t} \right)^4$$

$$g = 1 + \left[0.1 + 0.35 \left(\frac{a}{t} \right)^2 \right] (1 - \sin \phi)^2$$

$$f_{\phi} = \left[\left(\frac{a}{c} \right)^2 \cos^2 \phi + \sin^2 \phi \right]^{1/4}$$

$$H_1 = 1 - 0.34 \frac{a}{t} - 0.11 \frac{a}{c} \frac{a}{t}$$

$$H_2 = 1 - \left[1.22 + 0.12 \frac{a}{c} \right] \frac{a}{t} + \left[0.55 - 1.05 \left(\frac{a}{c} \right)^{3/4} + 0.47 \left(\frac{a}{c} \right)^{3/2} \right] \left(\frac{a}{t} \right)^2$$

$$p = 0.2 + a/c + 0.6 a/t$$

for $a/c > 1$ (deep surface crack)

$$m = \sqrt{\frac{c}{a}} \left(1 + 0.04 \frac{c}{a} \right) + 0.2 \left(\frac{c}{a} \right)^4 \left(\frac{a}{t} \right)^2 - 0.11 \left(\frac{c}{a} \right)^4 \left(\frac{a}{t} \right)^4$$

$$g = 1 + \left[0.1 + 0.35 \frac{c}{a} \left(\frac{a}{t} \right)^2 \right] (1 - \sin \phi)^2$$

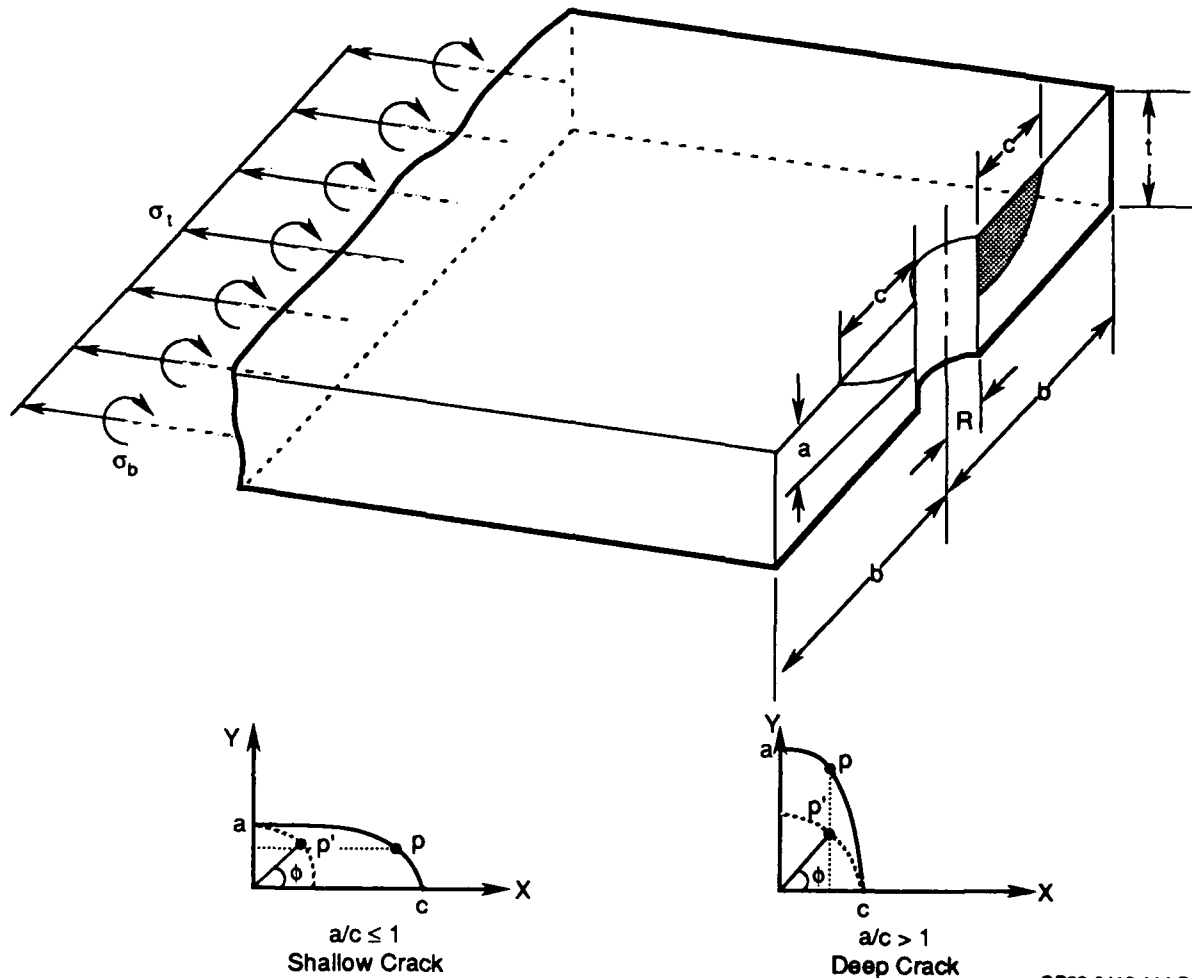
$$f_{\phi} = \left[\left(\frac{c}{a} \right)^2 \sin^2 \phi + \cos^2 \phi \right]^{1/4}$$

$$H_1 = 1 - \left(0.04 + 0.41 \frac{c}{a} \right) \frac{a}{t} + \left[0.55 - 1.93 \left(\frac{c}{a} \right)^{3/4} + 1.38 \left(\frac{c}{a} \right)^{3/2} \right] \left(\frac{a}{t} \right)^2$$

$$H_2 = 1 - \left(2.11 - 0.77 \frac{c}{a} \right) \frac{a}{t} + \left[0.55 - 0.72 \left(\frac{c}{a} \right)^{3/4} + 0.14 \left(\frac{c}{a} \right)^{1.5} \right] \left(\frac{a}{t} \right)^2$$

$$p = 0.2 + c/a + 0.6 a/t$$

Crack Code: 1020 - One Corner Crack From Center Open Hole
1030 - Two Corner Cracks From Center Open Hole



GP93-0418-114-D

The angle, ϕ , represents the point along the part-through crack perimeter, P , at which the stress intensity, K , is computed.

To calculate K for the crack depth, a , $\phi = 90$
 To calculate K for the crack length, c , $\phi = 10$

The point, P , is defined using the following procedure:

- 1) A circular arc is drawn which is within the crack perimeter and which has a radius equal to " a " for a shallow crack (or " c " for a deep crack);
- 2) The point along the arc, P' , is defined by ϕ which is measured from the X axis;
- 3) A line is drawn parallel to the X axis for a shallow crack (or parallel to the Y axis for a deep crack) through P' to the crack perimeter.

Crack Code: 1020 - One Corner Crack from Center Open Hole
 1030 - Two Corner Cracks from Center Open Hole

Reference: Newman, J. C. and Raju, I. S., "Stress Intensity Factor Equations for Cracks in Three Dimensional Finite Bodies Subjected to Tension and Bending Loads," NASA Tech Memorandum 85793, April 1984.

$$K = K_t(\phi) + K_b(\phi)$$

t - tension, b - bending

$$K_a = K_t(\phi=90^\circ) + K_b(\phi=90^\circ)$$

$$K_c = K_t(\phi=10^\circ) + K_b(\phi=10^\circ)$$

$$K_t(\phi) = \sigma_t \sqrt{\frac{a}{\pi Q}} F \quad K_b(\phi) = \sigma_b \sqrt{\frac{a}{\pi Q}} F H$$

where

$$Q = 1 + 1.464 \left(\frac{a}{c}\right)^{1.65} \quad \text{for } \frac{a}{c} \leq 1$$

$$Q = 1 + 1.464 \left(\frac{a}{c}\right)^{1.65} \quad \text{for } \frac{a}{c} > 1$$

$$F = m_1 g_2 g_3 g_4 f_\phi f_w$$

$$H = H_1 + (H_2 - H_1) \sin^P \phi$$

and

$$g_2 = \frac{1 + 0.358\lambda + 1.425\lambda^2 - 1.578\lambda^3 + 2.156\lambda^4}{1 + 0.13\lambda^2}$$

where

$$\lambda = \frac{1}{1 + c/R \cos(\mu\phi)}$$

$$\mu = 0.85 \quad - \text{ tension}$$

$$\mu = 0.85 - 0.25 (a/t)^{1/4} \quad - \text{ bending}$$

$$f_w = \left[\sec\left(\frac{\pi R}{2b}\right) \sec\left(\frac{\pi(2R+nc)}{4(b-c)+2nc} \sqrt{\frac{a}{t}} \right]^{1/2} \quad n = \# \text{ of cracks} \\ (1 \text{ or } 2)$$

for $a/c \leq 1$

$$m = (1.13 - 0.09 a/c) + \left[-0.54 + \frac{0.89}{0.2 + a/c} \right] \left(\frac{a}{t} \right)^2 \\ + \left[0.5 - \frac{1}{0.65 + a/c} + 14(1 - a/c)^{24} \right] \left(\frac{a}{t} \right)^4$$

$$g_1 = 1 + \left[0.1 + 0.35 \left(\frac{a}{t} \right)^2 \right] (1 - \sin \phi)^2$$

$$g_3 = \left[1 + 0.04 \frac{a}{c} \right] \left[1 + 0.1(1 - \cos \phi)^2 \right] \left[0.85 + 0.15 \left(\frac{a}{t} \right)^{1/4} \right]$$

$$g_4 = 1 - 0.7 \left(1 - \frac{a}{t} \right) \left(\frac{a}{c} - 0.2 \right) \left(1 - \frac{a}{c} \right)$$

$$f_\phi = \left[\left(\frac{a}{c} \right)^2 \cos^2 \phi + \sin^2 \phi \right]^{1/4}$$

$$H_1 = 1 + \left[-0.43 - 0.74 \frac{a}{c} - 0.84 \left(\frac{a}{c} \right)^2 \right] \frac{a}{t} + \\ \left[1.25 - 1.19 \frac{a}{c} + 4.39 \left(\frac{a}{c} \right)^2 \right] \left(\frac{a}{t} \right)^2 - \left[1.94 - 4.22 \frac{a}{c} + 5.51 \left(\frac{a}{c} \right)^2 \right] \left(\frac{a}{t} \right)^3$$

$$H_2 = 1 + \left[-1.50 - 0.04 \frac{a}{c} - 1.73 \left(\frac{a}{c} \right)^2 \right] \frac{a}{t} + \\ \left[1.71 - 3.17 \frac{a}{c} + 6.84 \left(\frac{a}{c} \right)^2 \right] \left(\frac{a}{t} \right)^2 - \left[1.28 - 2.71 \frac{a}{c} + 5.22 \left(\frac{a}{c} \right)^2 \right] \left(\frac{a}{t} \right)^3$$

$$p = 0.1 + 1.3 \frac{a}{t} + 1.1 \frac{a}{c} - 0.7 \frac{a}{c} \frac{a}{t}$$

for $a/c > 1$

$$m = \sqrt{\frac{c}{a}} \left(1 + 0.04 \frac{c}{a} \right) + 0.2 \left(\frac{c}{a} \right)^4 \left(\frac{a}{t} \right)^2 - 0.11 \left(\frac{c}{a} \right)^4 \left(\frac{a}{t} \right)^4$$

$$g_1 = 1 + \left[0.1 + 0.35 \frac{c}{a} \left(\frac{a}{t} \right)^2 \right] (1 - \sin \phi)^2$$

$$g_3 = \left(1.13 - 0.09 \frac{c}{a} \right) \left[1 + 0.1 (1 - \cos \phi)^2 \right] \left[0.85 + 0.15 \left(\frac{a}{t} \right)^{1/4} \right]$$

$$g_4 = 1$$

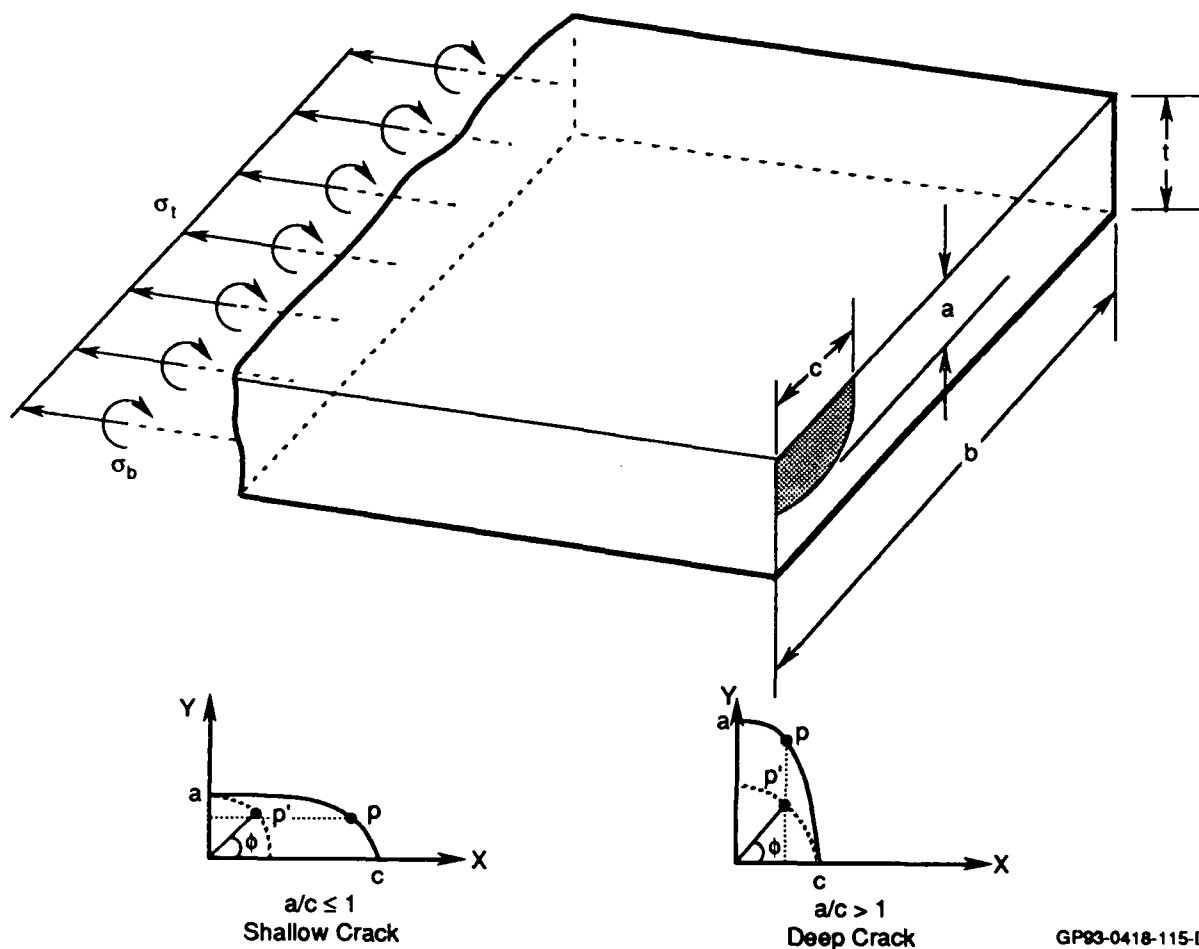
$$f_\phi = \left[\left(\frac{c}{a} \right)^2 \sin^2 \phi + \cos^2 \phi \right]^{1/4}$$

$$H_1 = 1 - \left(2.07 - 0.06 \frac{c}{a} \right) \frac{a}{t} + \left(4.35 + 0.16 \frac{c}{a} \right) \left(\frac{a}{t} \right)^2 - \left(2.93 + 0.30 \frac{c}{a} \right) \left(\frac{a}{t} \right)^3$$

$$H_2 = 1 - \left(3.64 - 0.37 \frac{c}{a} \right) \frac{a}{t} + \left(5.87 - 0.49 \frac{c}{a} \right) \left(\frac{a}{t} \right)^2 - \left(4.32 - 0.53 \frac{c}{a} \right) \left(\frac{a}{t} \right)^3$$

$$p = 0.2 + c/a + 0.6 a/t$$

Crack Code: 1040 - One Corner Edge Crack



The angle, ϕ , represents the point along the part-through crack perimeter, P , at which the stress intensity, K , is computed.

To calculate K for the crack depth, a , $\phi = 90$

To calculate K for the crack length, c , $\phi = 10$

The point, P , is defined using the following procedure:

- 1) A circular arc is drawn which is within the crack perimeter and which has a radius equal to " a " for a shallow crack (or " c " for a deep crack);
- 2) The point along the arc, P' , is defined by ϕ which is measured from the X axis;
- 3) A line is drawn parallel to the X axis for a shallow crack (or parallel to the Y axis for a deep crack) through P' to the crack perimeter.

Crack Code: 1040 - One Corner Edge Crack

Reference: Newman, J. C. and Raju, I. S., "Stress Intensity Factor Equations for Cracks in Three Dimensional Finite Bodies Subjected to Tension and Bending Loads," NASA Tech Memorandum 85793, April 1984.

$$K = K_t(\phi) + K_b(\phi)$$

t - tension, b - bending

$$K_a = K_t(\phi=90^\circ) + K_b(\phi=90^\circ)$$

$$K_c = K_t(\phi=10^\circ) + K_b(\phi=10^\circ)$$

$$K_t(\phi) = \sigma_t \sqrt{\frac{a}{\pi Q}} F \quad K_b(\phi) = \sigma_b \sqrt{\frac{a}{\pi Q}} F H$$

where

$$Q = 1 + 1.464 \left(\frac{a}{c} \right)^{1.65} \quad \text{for } \frac{a}{c} \leq 1$$

$$Q = 1 + 1.464 \left(\frac{c}{a} \right)^{1.65} \quad \text{for } \frac{a}{c} > 1$$

$$F = m_1 g_1 g_2 f_\phi f_w$$

$$H = H_1 + (H_2 - H_1) \sin^p \phi$$

$$f_w = 1 - 0.2\lambda + 9.4\lambda^2 - 19.4\lambda^3 + 27.1\lambda^4$$

$$\lambda = \frac{c}{b} \sqrt{\frac{a}{t}}$$

for $a/c \leq 1$

$$m = (1.08 - 0.03 a/c) + \left(-0.44 + \frac{1.06}{0.3 + a/c} \right) \left(\frac{a}{t} \right)^2$$

$$+ \left(-0.5 + 0.25 \frac{a}{c} + 14.8 \left(1 - \frac{a}{c} \right)^{15} \right) \left(\frac{a}{t} \right)^4$$

$$g_1 = 1 + \left[0.08 + 0.40 \left(\frac{a}{t} \right)^2 \right] (1 - \sin \phi)^3$$

$$g_2 = 1 + \left[0.08 + 0.15 \left(\frac{a}{t} \right)^2 \right] (1 - \cos \phi)^3$$

$$f_\phi = \left[\left(\frac{a}{c} \right)^2 \cos^2 \phi + \sin^2 \phi \right]^{1/4}$$

$$H_1 = 1 - 0.34 \frac{a}{t} - 0.11 \frac{a}{c} \frac{a}{t}$$

$$H_2 = 1 - \left(1.22 + 0.12 \frac{a}{c} \right) \frac{a}{t} + \left[0.64 - 1.05 \left(\frac{a}{c} \right)^{3/4} + 0.47 \left(\frac{a}{c} \right)^{3/2} \right] \left(\frac{a}{t} \right)^2$$

$$p = 0.2 + a/c + 0.6 a/t$$

for $a/c > 1$ (deep surface crack)

$$m = \sqrt{\frac{c}{a}} \left(1.08 - 0.03 \frac{c}{a} \right) + 0.375 \left(\frac{c}{a} \right)^2 \left(\frac{a}{t} \right)^2 - 0.25 \left(\frac{c}{a} \right)^2 \left(\frac{a}{t} \right)^4$$

$$g_1 = 1 + \left[0.08 + 0.40 \left(\frac{c}{t} \right)^2 \right] (1 - \sin \phi)^3$$

$$g_2 = 1 + \left[0.08 + 0.15 \left(\frac{c}{t} \right)^2 \right] (1 - \cos \phi)^3$$

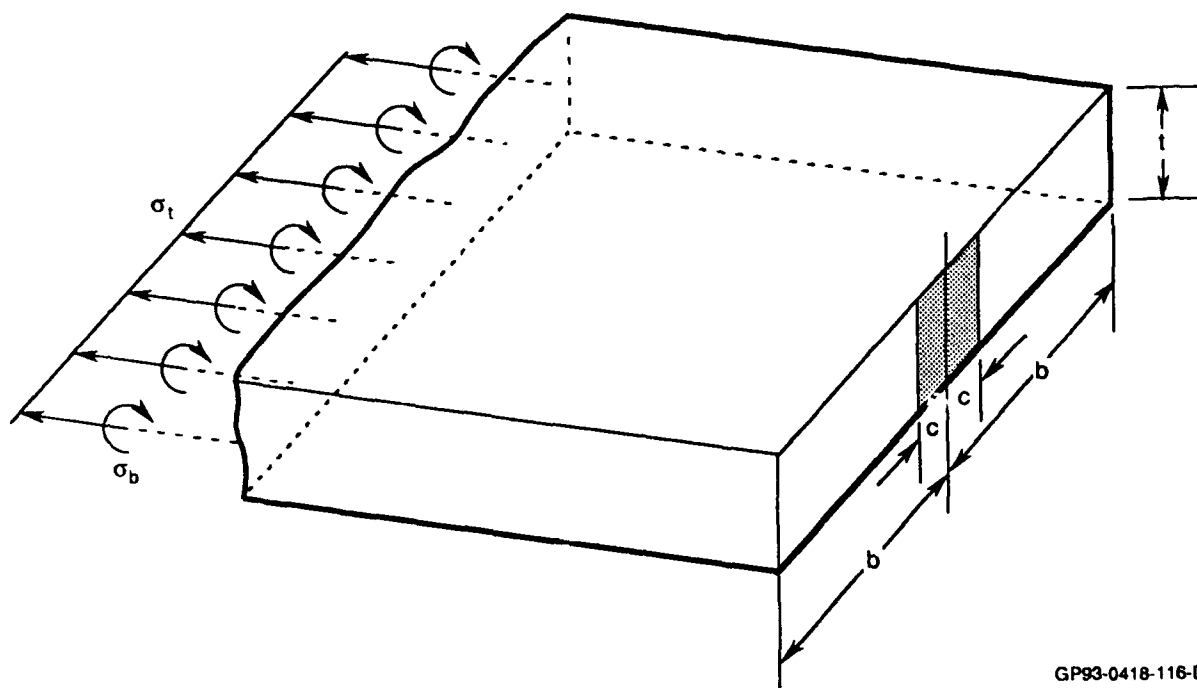
$$f_\phi = \left[\left(\frac{c}{a} \right)^2 \sin^2 \phi + \cos^2 \phi \right]^{1/4}$$

$$H_1 = 1 - \left(0.04 + 0.41 \frac{c}{a} \right) \frac{a}{t} + \left[0.55 - 1.93 \left(\frac{c}{a} \right)^{3/4} + 1.38 \left(\frac{c}{a} \right)^{3/2} \right] \left(\frac{a}{t} \right)^2$$

$$H_2 = 1 - \left(2.11 - 0.77 \frac{c}{a} \right) \frac{a}{t} + \left[0.64 - 0.72 \left(\frac{c}{a} \right)^{3/4} + 0.14 \left(\frac{c}{a} \right)^{1.5} \right] \left(\frac{a}{t} \right)^2$$

$$p = 0.2 + c/a + 0.6 a/t$$

Crack Code: 2010 - Center Crack



GP93-0418-116-D

Crack Code: 2010 - Center Crack

References:

Tension - ASTM E647-78T, "Tentative Test Method for Constant-Load-Amplitude Fatigue Crack Growth Rate Above 10^{-8} m/cyc," 1978 Annual Book of Standard, Vol. 10.

Bending - Rooke, D. P. and Cartwright, D. J., "Compendium of Stress Intensity Factors," 1976.

$$K = K_t + K_b$$

t - tension, b - bending

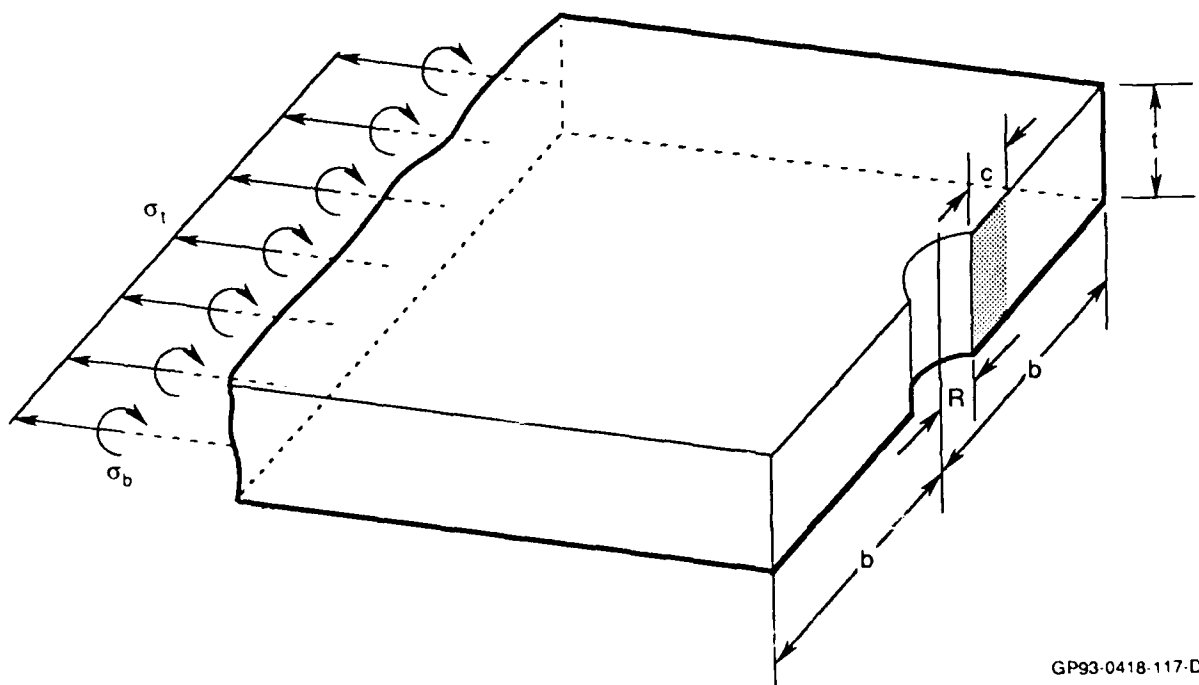
$$K_t = \sigma_t \sqrt{\pi c} \sqrt{\sec\left(\frac{\pi c}{2b}\right)}$$

$$K_b = \sigma_b \sqrt{\pi c} \frac{(1+\nu)}{(3+\nu)} \beta \quad \text{where } \beta \text{ is defined by the following table}$$

c/b	β
0.000	1.000
0.050	1.002
0.105	1.006
0.125	1.008
0.150	1.012
0.195	1.022
0.240	1.036
0.300	1.058
0.350	1.080
0.395	1.102
0.425	1.118
0.450	1.132
0.485	1.152

$$\text{Note: } \beta = \sqrt{\sec\left(\frac{\pi c}{2b}\right)}$$

Crack Code: 2020 - One Crack From Center Open Hole



GP93-0418-117-D

Crack Code: 2020 - One Crack from Center Open Hole

References:

Tension - Newman, J. C., "Predicting Failure of Specimens With Either Surface Cracks or Corner Cracks at Holes," NASA TN D-8244, June 1976.

Bending - Rooke, D. P. and Cartwright, D. J., "Compendium of Stress Intensity Factors," 1976.

$$K = K_t + K_b$$

t - tension, b - bending

$$K_t = \sigma_t \sqrt{\pi c} f_w (0.707 - 0.18\lambda + 6.55\lambda^2 - 10.54\lambda^3 + 6.85\lambda^4)$$

$$\text{where } \lambda = \frac{1}{1 + c/R} \text{ and } f_w = \sqrt{\sec\left[\frac{\pi}{2}\left(\frac{2R+c}{2b-c}\right)\right] \sec\left(\frac{\pi R}{2b}\right)}$$

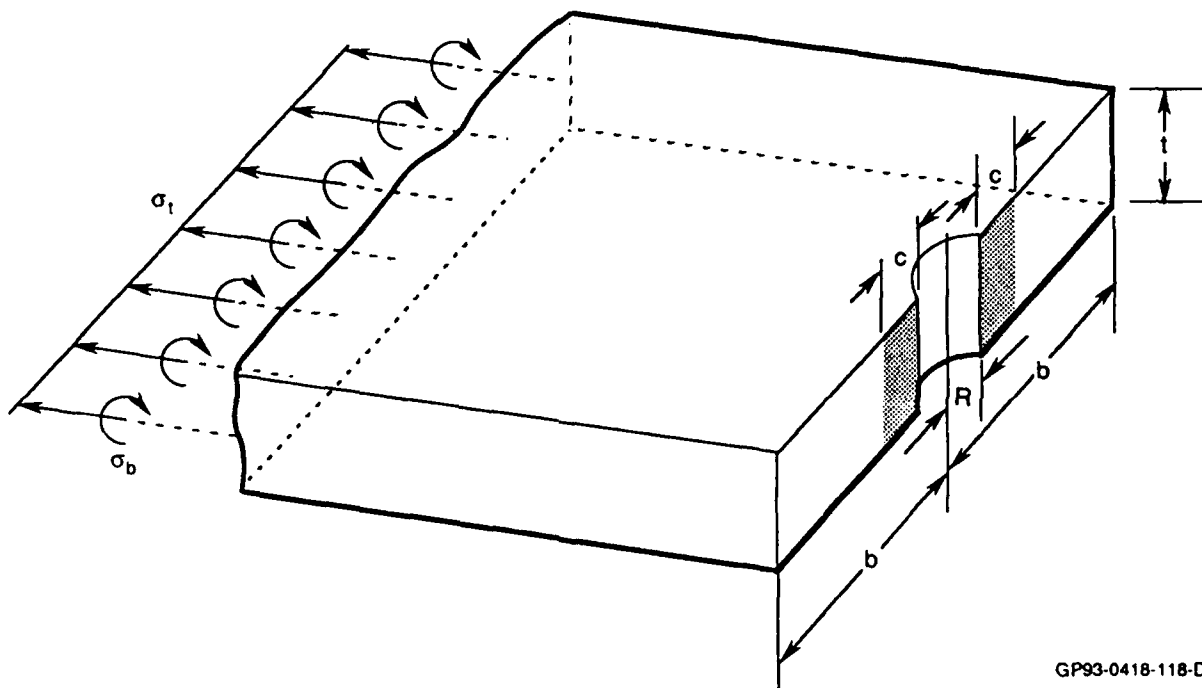
A bending solution was provided in the reference for an infinitely wide plate. This solution was multiplied by the finite width factor, f_w , for tension loads.

$$K_b = \sigma_b \sqrt{\pi(c+R)} \frac{(1+\nu)}{(3+\nu)} \beta f_w$$

where f_w is defined above and β is listed in the following table.

$(c+R)/R$	β
1.05	0.40
1.10	0.52
1.15	0.62
1.20	0.68
1.25	0.72
1.30	0.76
1.40	0.82
1.50	0.86
1.60	0.88
1.70	0.90
1.80	0.91
2.00	0.92
2.25	0.92
2.50	0.91
2.90	0.90
3.60	0.88
4.30	0.86
5.00	0.84

Crack Code: 2030 - Two Cracks From Center Open Hole



Crack Code: 2030 - Two Cracks from Center Open Hole

References:

Tension - Newman, J. C., "Predicting Failure of Specimens With Either Surface Cracks or Corner Cracks at Holes," NASA TN D-8244, June 1976.

Bending - Rooke, D. P. and Cartwright, D. J., "Compendium of Stress Intensity Factors," 1976.

$$K = K_t + K_b$$

t - tension, b - bending

$$K_t = \sigma_t \sqrt{\pi c} f_w (1.00 - 0.15\lambda + 3.46\lambda^2 - 4.47\lambda^3 + 3.52\lambda^4)$$

$$\text{where } \lambda = \frac{1}{1 + c/R} \text{ and } f_w = \sqrt{\sec\left[\frac{\pi}{2}\left(\frac{R+c}{b}\right)\right] \sec\left(\frac{\pi R}{2b}\right)}$$

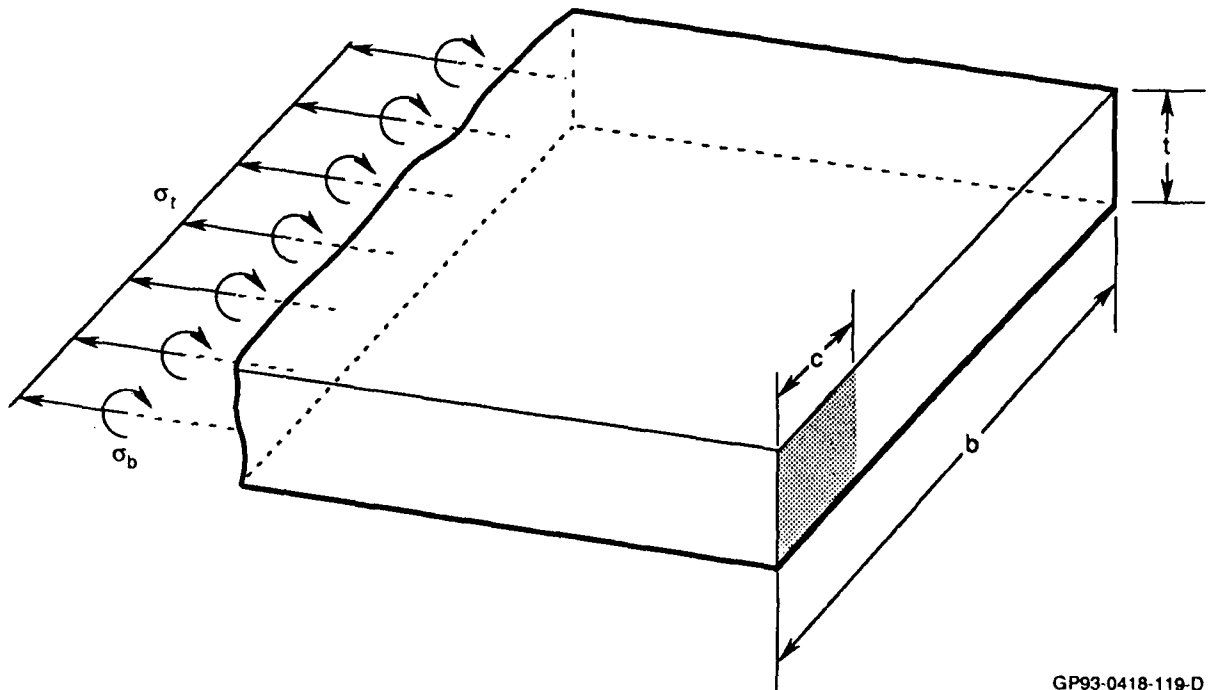
A bending solution was provided in the reference for an infinitely wide plate. This solution was multiplied by the finite width factor, f_w , for tension loads.

$$K_b = \sigma_b \sqrt{\pi(c+R)} \frac{(1+\nu)}{(3+\nu)} \beta f_w$$

where f_w is defined above and β is listed in the following table.

$(c+R)/R$	β
1.05	0.40
1.10	0.52
1.15	0.62
1.20	0.68
1.25	0.74
1.30	0.78
1.40	0.83
1.50	0.87
1.60	0.90
1.70	0.92
1.80	0.94
2.00	0.96
2.25	0.97
2.50	0.98
2.90	0.99
3.60	1.00
4.30	1.00
5.00	1.00

Crack Code: 2040 - One Edge Crack



GP93-0418-119-D

Crack Code: 2040 - One Edge Crack

References: Tada, H., Paris, P., and Irwin, T., The Stress Analysis of Cracks Handbook, Del Research Corp, 1973.

$$K = K_t + K_b$$

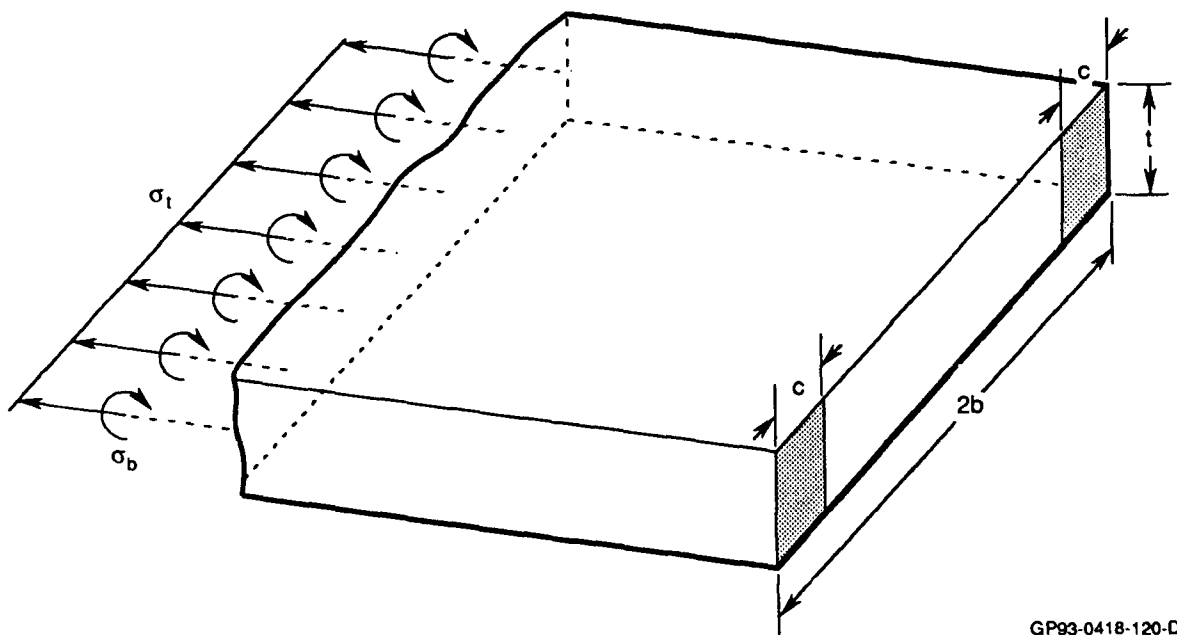
t - tension, b - bending

$$K_t = \sigma_t \sqrt{\pi c} \left[\frac{0.752 + 2.02 \frac{c}{b} + 0.37 \left[1 - \sin\left(\frac{\pi c}{2b}\right) \right]^3}{\cos\left(\frac{\pi c}{2b}\right)} \right] \sqrt{\frac{2b}{\pi c} \tan\left(\frac{\pi c}{2b}\right)}$$

A finite width bending solution was determined by multiplying the infinite width bending solution by the finite width factor for a center cracked panel.

$$K_b = \sigma_b \sqrt{\pi c} \left(1.12 \frac{(1+\nu)}{(3+\nu)} \sqrt{\sec\left(\frac{\pi c}{b}\right)} \right)$$

Crack Code: 2050-Two Edge Cracks



GP93-0418-120-D

Crack Code: 2050 - Two Edge Cracks

References: Tada, H., Paris, P., and Irwin, T., The Stress Analysis of Cracks Handbook, Del Research Corp, 1973.

$$K = K_t + K_b$$

t - tension, b - bending

$$K_t = \sigma_t \sqrt{\pi c} \left[1 + 0.122 \cos^4 \left(\frac{\pi c}{2b} \right) \right] \sqrt{\frac{2b}{\pi c} \tan \left(\frac{\pi c}{2b} \right)}$$

A finite width bending solution was determined by multiplying the finite width tension solution by the ratio of the bending to tension solutions for a single edge crack (Crack Code 2040).

$$K_b = \sigma_b \sqrt{\pi c} \frac{(1+\nu)}{(3+\nu)} \beta$$

$$\text{where } \beta = \beta_t \left(\frac{\beta_b}{\beta_t} \right)_{2040}$$

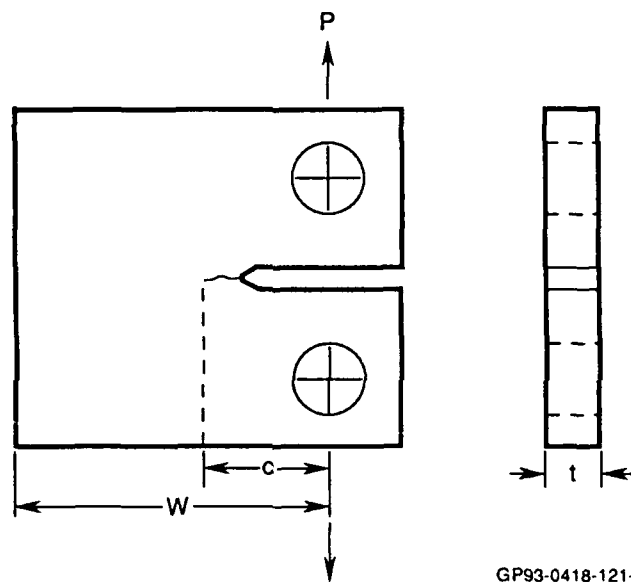
$$\beta_t = \left[1 + 0.122 \cos^4 \left(\frac{\pi c}{2b} \right) \right] \sqrt{\frac{2b}{\pi c} \tan \left(\frac{\pi c}{2b} \right)}$$

$$\beta_b (2040) = 1.12 \sqrt{\sec \left(\frac{\pi c}{b} \right)}$$

$$\beta_t (2040) = \left[\frac{0.752 + 2.02 \frac{c}{b} + 0.37 \left[1 - \sin \left(\frac{\pi c}{2b} \right) \right]^3}{\cos \left(\frac{\pi c}{2b} \right)} \right] \sqrt{\frac{2b}{\pi c} \tan \left(\frac{\pi c}{2b} \right)}$$

Note: The variable "b" represents the plate width for the one edge crack solutions and the plate half width for the two edge cracks solutions.

Crack Code: 2060-ASTM Compact Tension Specimen



GP93-0418-121-D

Crack Code: 2060 - ASTM Compact Tension Specimen

References: ASTM E647-78T, "Tentative Test Method for
Constant-Load-Amplitude Fatigue Crack Growth Rate Above 10^{-8} m/cyc,"
1978 Annual Book of Standard, Vol. 10.

$$K = \frac{P}{t\sqrt{w}}(2+\alpha)(0.886 + 4.64\alpha - 13.32\alpha^2 + 14.72\alpha^3 - 5.6\alpha^4)/(1-\alpha)^{1.5}$$

where $\Gamma = \sigma t w$ and $\alpha = c/w$

Crack Code: 2070 - User Defined Stress Intensity Solution

$$K = K_t + K_b$$

$$K_t = \sigma_t \sqrt{\pi c} \beta_t$$

$$K_b = \sigma_b \sqrt{\pi c} \beta_b$$

where β_t and β_b are defined by the user in an input data file.

The file must consist of a title, number of points, and c vs. β data for both the tension and bending solutions. The exact format is listed below.

Title for tension data

of points - np

c_i β_{ti}

c_{i+1} $\beta_{t(i+1)}$

. .

. .

. .

c_{np} β_{tnp}

Title for bending data

of points - np

c_i β_{bi}

c_{i+1} $\beta_{b(i+1)}$

. .

. .

. .

c_{np} β_{bnp}

APPENDIX B
MATERIAL DATA FILES

6Al-2Sn-4Zr-2Mo Titanium

1) TI6242RT2.DAT - Room Temperature Crack Growth Rate Data

TI-6-2-4-2 ROOM TEMPERATURE R=0.02

22 0.02 78.00

9.30 3.07813E-7

10.38 5.26316E-7

10.90 6.90000E-7

11.07 7.14815E-7

11.24 7.17857E-7

11.58 8.41667E-7

11.75 9.95000E-7

12.60 1.66667E-6

12.76 1.84906E-6

13.45 2.20000E-6

14.33 3.48077E-6

15.41 4.29545E-6

16.75 6.25000E-6

17.99 8.08000E-6

18.88 9.70000E-6

20.05 1.28333E-5

21.61 1.69167E-5

23.71 2.87143E-5

25.08 3.88000E-5

26.58 4.85000E-5

28.77 7.60714E-5

30.29 1.04706E-4

TI-6-2-4-2 ROOM TEMPERATURE R=0.10

5 0.10

11.61 1.81E-6

13.00 2.52E-6

16.00 4.82E-6

20.00 10.3E-6

24.68 22.0E-6

TI-6-2-4-2 ROOM TEMPERATURE R=0.50

7 0.50

7.050 0.52E-6

8.000 0.919E-6

9.000 1.50E-6

10.00 2.27E-6

13.00 5.70E-6

16.00 10.5E-6

19.52 17.1E-6

TI-6-2-4-2 ROOM TEMPERATURE R=0.50

54 0.50

11.98320 2.8164297E-06

12.04811 3.1324630E-06

12.11879	3.3833046E-06
12.17333	3.6212468E-06
12.28454	4.0549276E-06
12.36720	3.9440069E-06
12.44780	3.8894468E-06
12.48791	4.2945362E-06
12.54067	4.7090498E-06
12.57504	4.8018751E-06
12.66501	5.8475948E-06
12.72880	6.3776329E-06
12.80059	5.9811596E-06
12.85642	6.4148053E-06
12.90194	6.6544440E-06
12.99314	7.0302417E-06
13.07669	7.3894516E-06
13.21272	8.1730259E-06
13.29805	8.2586066E-06
13.39075	8.3101295E-06
13.46981	8.3922550E-06
13.51792	8.4707926E-06
13.66700	8.2171482E-06
13.72843	7.5792177E-06
13.79089	7.7188570E-06
13.81223	7.5430526E-06
13.93681	9.3804574E-06
13.99659	9.7616230E-06
14.11848	1.0908473E-05
14.26966	1.2121943E-05
14.34134	1.1686649E-05
14.51358	1.1355761E-05
14.60792	1.1158489E-05
14.71465	1.1651543E-05
14.78842	1.1146747E-05
15.00462	1.2409668E-05
15.19287	1.3376794E-05
15.30642	1.4070672E-05
15.48597	1.4556725E-05
15.65467	1.4021382E-05
15.76318	1.4138620E-05
15.82262	1.5209803E-05
16.01170	1.5989304E-05
16.28555	1.9204103E-05
16.56050	2.1336795E-05
16.77507	2.2243912E-05
17.04708	2.2701510E-05
17.30437	2.2069786E-05
17.57232	2.3255678E-05
17.89989	2.5606403E-05
18.24158	2.8371218E-05
18.55007	3.1142401E-05
19.23823	3.7649676E-05
20.16906	4.7966798E-05
TI-6-2-4-2	ROOM TEMPERATURE R=-0.30
108	-0.30

12.82337	5.2009959E-06
12.97266	5.6151684E-06
13.09086	5.8142800E-06
13.16851	5.8059709E-06
13.26294	5.9353806E-06
13.41803	6.1870969E-06
13.49929	6.4058645E-06
13.53793	6.4418364E-06
13.76488	7.5926609E-06
13.93729	8.4674484E-06
13.97129	8.2388697E-06
14.05782	8.5791498E-06
14.22992	8.6272548E-06
14.28748	6.9762627E-06
14.32428	7.1095915E-06
14.33768	7.1251729E-06
14.42274	8.6874461E-06
14.44691	9.8769269E-06
14.50067	1.2479446E-05
14.57167	1.3728237E-05
14.61493	1.2968489E-05
14.66046	1.1947954E-05
14.69509	1.1999944E-05
14.74601	9.6366502E-06
14.78539	9.0765370E-06
14.82199	9.2224373E-06
14.86633	9.7961156E-06
15.00185	1.1414328E-05
15.04350	1.1483757E-05
15.13538	1.1476663E-05
15.19723	1.0407384E-05
15.22690	1.1109881E-05
15.26538	1.0121292E-05
15.29154	1.1398432E-05
15.37548	1.3606118E-05
15.43989	1.4733459E-05
15.54496	1.5234850E-05
15.64868	1.2797284E-05
15.70166	1.1275174E-05
15.72434	8.3691657E-06
15.78756	7.7297618E-06
15.80926	8.5869297E-06
15.86076	1.0030038E-05
15.93224	1.0987487E-05
15.95824	1.0908690E-05
15.99744	1.1149641E-05
16.04755	1.1239395E-05
16.15843	1.2542925E-05
16.24445	1.2560793E-05
16.29879	1.2340795E-05
16.36464	1.2845288E-05
16.46422	1.2502209E-05
16.54106	1.3152179E-05
16.59485	1.4316377E-05

16.68795	1.5063582E-05
16.75615	1.5057115E-05
16.78927	1.4292285E-05
16.86914	1.4082717E-05
16.94968	1.4702307E-05
17.04775	1.4100667E-05
17.10599	1.4670114E-05
17.20381	1.5170020E-05
17.32992	1.5539656E-05
17.41803	1.5061084E-05
17.53664	1.7711438E-05
17.75014	1.8013920E-05
17.82653	1.7890037E-05
17.91034	1.8523291E-05
18.05436	1.7960070E-05
18.17182	1.7136503E-05
18.30613	1.7411818E-05
18.44029	1.6765325E-05
18.50782	1.6932036E-05
18.57791	1.7327224E-05
18.74128	1.9000336E-05
18.83856	1.8765028E-05
18.90606	1.9271847E-05
18.95753	2.0664320E-05
19.08171	1.9507541E-05
19.19134	2.0310723E-05
19.31847	1.9567175E-05
19.41556	1.9975116E-05
19.49946	2.0071600E-05
19.63835	1.9934578E-05
19.68287	1.9071687E-05
19.88767	1.9036064E-05
19.96734	1.7519975E-05
20.02521	1.8806437E-05
20.07030	1.8965216E-05
20.14116	2.0865726E-05
20.22377	2.3731989E-05
20.50712	2.3250712E-05
20.58362	2.3674520E-05
20.81771	2.3812305E-05
21.05214	2.4260897E-05
21.37333	2.5420326E-05
21.51024	2.3881536E-05
21.56993	2.4602281E-05
21.66741	2.4229699E-05
21.88215	2.9365623E-05
22.17611	2.9424355E-05
22.33858	2.9658011E-05
22.57344	3.0073223E-05
22.88409	2.8046670E-05
23.18898	2.8611159E-05
23.68212	3.2006315E-05
23.99647	3.5426925E-05
24.21318	3.6321631E-05

2) T16242700.DAT - 700°F Crack Growth Rate Data

TI-6-2-4-2 700F R = 0.02

68 0.02 700.0

12.95973	1.0056033E-06
12.99192	7.8809262E-07
13.04954	7.9894102E-07
13.14170	8.8513031E-07
13.25886	9.1989870E-07
13.29782	9.4468209E-07
13.49434	1.1046782E-06
13.56874	1.0778213E-06
13.66747	1.1563257E-06
13.81178	1.2927418E-06
13.96857	1.2801155E-06
14.11185	1.5064323E-06
14.20719	1.6682834E-06
14.40443	2.2051595E-06
14.67244	2.7822230E-06
14.76923	2.7287454E-06
14.89188	3.0283622E-06
15.22182	3.2340999E-06
15.48823	3.3238514E-06
15.65521	3.3845729E-06
15.84199	3.5130602E-06
16.08624	3.8739713E-06
16.28523	5.1996740E-06
16.45148	4.8149209E-06
16.57772	5.2593923E-06
16.79273	5.9072008E-06
17.30968	5.8649211E-06
17.58196	6.4218902E-06
17.61520	6.6399616E-06
18.00100	7.5614935E-06
18.14235	7.3509746E-06
18.22273	7.2517732E-06
18.32751	7.0786923E-06
18.52680	7.2474968E-06
18.63632	7.1891154E-06
19.29768	8.6871423E-06
19.49935	8.2399511E-06
19.61622	8.2545212E-06
19.69949	8.7507233E-06
19.98705	9.0179137E-06
20.22674	1.0655602E-05
20.40662	1.1452321E-05
20.59579	1.1874525E-05
20.78944	1.2107944E-05
20.96605	1.2032046E-05
21.18143	1.1868566E-05
21.49658	1.1556473E-05
21.86902	1.1779997E-05
22.35209	1.2713339E-05
22.48677	1.3376775E-05

22.74924	1.3510255E-05
22.95592	1.4401023E-05
23.36759	1.4886061E-05
23.64969	1.5333888E-05
23.87181	1.6005335E-05
24.21987	1.6798056E-05
24.38649	1.7594552E-05
24.48992	1.7285762E-05
24.77601	1.8463743E-05
25.29716	1.8871462E-05
25.59401	2.0063921E-05
25.80326	2.0755206E-05
26.22368	2.1449376E-05
27.34283	2.6425871E-05
27.76544	2.7218475E-05
28.22918	2.8682938E-05
28.70186	3.0037942E-05
29.09566	3.1351978E-05

3) TI6242TP.DAT - 1000°F Crack Growth Rate Data

TI-6-2-4-2 1000F R=0.02

59 0.02 1000.0

12.24114	2.3771713E-06
12.55290	2.5807217E-06
12.70512	2.5472250E-06
12.89219	2.7193116E-06
12.93233	2.9396856E-06
13.10742	3.3338774E-06
13.12374	3.1883694E-06
13.26810	3.4697464E-06
13.49421	3.9242336E-06
13.67379	3.8123430E-06
13.89904	3.8387457E-06
14.23550	3.9562055E-06
14.26045	3.9894949E-06
14.51546	4.2375746E-06
14.60703	4.3809814E-06
14.77401	4.6619680E-06
14.86581	4.8394736E-06
15.09969	5.5440028E-06
15.36435	6.1301789E-06
15.96983	7.0947394E-06
16.25931	7.3051692E-06
16.67159	7.5013659E-06
16.81885	7.5170583E-06
17.04979	7.8877429E-06
17.10549	7.8029761E-06
17.30001	8.1802400E-06
17.78446	9.4044799E-06
17.82433	9.4943625E-06
17.93093	9.4268817E-06
18.01577	9.8757710E-06
18.33754	9.7455841E-06
18.72154	1.0282461E-05
18.84918	1.0867386E-05
19.45422	1.2636085E-05
19.47469	1.2955852E-05
19.76695	1.3927078E-05
20.21700	1.5436977E-05
20.79997	1.7068791E-05
21.13082	1.8892322E-05
21.18698	1.7649640E-05
21.31914	1.7553257E-05
21.37223	1.8657376E-05
21.99438	1.9491576E-05
22.63980	2.0636136E-05
23.62510	2.2672484E-05
23.93072	2.3686584E-05
24.15357	2.4279503E-05
24.48113	2.5801064E-05
24.83452	2.7034856E-05

25.14293	2.8575590E-05
25.56205	2.9076406E-05
25.74034	2.9335804E-05
26.32083	3.2541524E-05
27.42282	3.8681563E-05
29.17190	4.8827787E-05
29.63471	5.1419171E-05
33.25778	6.5345404E-05
33.61279	8.1460370E-05
34.78603	9.7299111E-05
TI-6-2-4-2	1000F R=0.50
43 0.50	
14.44246	7.1119521E-06
14.60479	7.3203460E-06
14.72137	6.1384785E-06
14.84515	5.5119503E-06
14.95541	6.1815758E-06
15.13469	8.4583735E-06
15.20060	8.9393125E-06
15.36571	9.7434058E-06
15.53156	1.0546978E-05
15.70399	9.4962988E-06
15.82073	9.4164352E-06
15.93539	9.1228067E-06
16.05022	9.4642746E-06
16.17923	1.0148793E-05
16.32849	9.9226090E-06
16.46310	9.7856928E-06
16.58619	9.5931282E-06
16.70918	1.0219855E-05
16.83220	1.1446466E-05
16.94442	1.1458976E-05
17.06814	1.3540745E-05
17.28940	1.5614583E-05
17.63342	1.7232231E-05
17.74346	1.7853015E-05
18.06975	1.9777443E-05
18.94416	2.6631968E-05
19.66923	3.2454376E-05
20.21969	3.6327063E-05
20.42749	3.1053340E-05
20.68716	3.3165510E-05
20.85464	2.7457145E-05
21.72616	3.1471718E-05
22.04916	3.3489541E-05
23.01842	3.9205228E-05
23.58749	4.2939602E-05
23.95889	4.4810065E-05
24.34722	4.7800204E-05
25.08644	5.2967844E-05
25.76475	6.0594055E-05
26.16533	6.3363295E-05
26.58566	6.5835957E-05
27.28802	7.2837502E-05
27.73828	8.0407954E-05

4) DAMTISLOW.DAT - Low Frequency Crack Growth Rate Data (Wei-Landes)

TI-6-2-4-2 R=0.02 30 SEC HOLD 1000F CCT

31	30.1	30
13.93651		4.1299941E-06
14.19901		5.9843810E-06
19.32822		1.0949999E-05
19.69200		1.2687482E-05
20.04570		1.9900024E-05
20.40559		1.0199994E-05
31.39969		5.0249993E-05
32.08582		6.5875050E-05
32.75226		6.4374952E-05
33.56441		7.8874975E-05
34.17585		5.9625356E-05
34.96577		7.7250006E-05
35.68145		1.4024944E-04
36.51009		8.1249920E-05
37.51283		9.8250064E-05
38.08798		1.1249990E-04
38.72849		1.2500018E-04
39.27319		1.0600001E-04
39.97333		1.3574987E-04
40.71850		1.4375031E-04
41.39631		1.2999952E-04
42.05339		1.2525023E-04
43.18528		2.1375000E-04
44.09497		1.6974985E-04
45.19314		2.0224988E-04
46.62813		2.5950014E-04
48.26014		2.8800010E-04
50.07355		3.1050027E-04
52.19106		3.4924984E-04
55.41023		5.0249993E-04
61.08631		8.0200017E-04

5) DAMTIFAST.DAT - High Frequency Crack Growth Rate Data (Wei-Landes)

TI-6-2-4-2 R=0.02 6HZ 1000F CCT

59 .1667 0.0

12.24114	2.3771713E-06
12.55290	2.5807217E-06
12.70512	2.5472250E-06
12.89219	2.7193116E-06
12.93233	2.9396856E-06
13.10742	3.3338774E-06
13.12374	3.1883694E-06
13.26810	3.4697464E-06
13.49421	3.9242336E-06
13.67379	3.8123430E-06
13.89904	3.8387457E-06
14.23550	3.9562055E-06
14.26045	3.9894949E-06
14.51546	4.2375746E-06
14.60703	4.3809814E-06
14.77401	4.6619680E-06
14.86581	4.8394736E-06
15.09969	5.5440028E-06
15.36435	6.1301789E-06
15.96983	7.0947394E-06
16.25931	7.3051692E-06
16.67159	7.5013659E-06
16.81885	7.5170583E-06
17.04979	7.8877429E-06
17.10549	7.8029761E-06
17.30001	8.1802400E-06
17.78446	9.4044799E-06
17.82433	9.4943625E-06
17.93093	9.4268817E-06
18.01577	9.8757710E-06
18.33754	9.7455841E-06
18.72154	1.0282461E-05
18.84918	1.0867386E-05
19.45422	1.2636085E-05
19.47469	1.2955852E-05
19.76695	1.3927078E-05
20.21700	1.5436977E-05
20.79997	1.7068791E-05
21.13082	1.8892322E-05
21.18698	1.7649640E-05
21.31914	1.7553257E-05
21.37223	1.8657376E-05
21.99438	1.9491576E-05
22.63980	2.0636136E-05
23.62510	2.2672484E-05
23.93072	2.3686584E-05
24.15357	2.4279503E-05
24.48113	2.5801064E-05
24.83452	2.7034856E-05

25.14293	2.8575590E-05
25.56205	2.9076406E-05
25.74034	2.9335804E-05
26.32083	3.2541524E-05
27.42282	3.8681563E-05
29.17190	4.8827787E-05
29.63471	5.1419171E-05
33.25778	6.5345404E-05
33.61279	8.1460370E-05
34.78603	9.7299111E-05

6) DAMTIYDKC.DAT - Yield Strength and Fracture Toughness Data

TI-6-2-4-2 Temperature vs. % Room Temperature Fty and Kc

11		
78	1.00	1.00
200	0.90	1.01
300	0.83	1.03
400	0.76	1.05
500	0.70	1.07
600	0.65	1.09
700	0.63	1.11
800	0.60	1.18
900	0.58	1.26
1000	0.56	1.33
1200	0.39	1.40

7) DAMTIEFYD.DAT - Effective Yield Strength Data

TI-6-2-4-2 Larson-Miller Data

19	20
18.0	1.0
19.0	1.0
20.0	0.98
21.0	0.96
22.0	0.92
23.0	0.88
24.0	0.79
25.0	0.70
26.0	0.61
27.0	0.52
28.0	0.43
29.0	0.34
30.0	0.25
31.0	0.19
32.0	0.14
33.0	0.09
34.0	0.06
35.0	0.04
36.0	0.03

8) DAMTIRSO.DAT - Overload Shut-Off Ratio Data

TI-6-2-4-2 RSO

2	
78.0	1.000
1000.0	2.250

Incone1 718

1) IN718RT2.DAT - Room Temperature Crack Growth Rate Data

IN 718 ROOM TEMPERATURE R=0.02

30 0.02 78.0

11.38 8.43478E-8

12.23 1.12921E-7

13.07 1.41429E-7

13.90 1.58984E-7

14.71 2.20000E-7

15.52 3.37931E-7

16.37 5.02778E-7

17.20 5.18750E-7

18.50 7.71154E-7

19.41 8.11538E-7

20.84 1.04737E-6

21.86 1.40714E-6

22.39 1.65833E-6

24.68 1.96667E-6

25.97 2.10000E-6

27.36 2.46250E-6

28.88 3.16667E-6

30.56 4.08000E-6

32.48 5.42857E-6

34.59 5.60526E-6

37.08 7.66071E-6

39.94 1.08125E-5

42.41 1.11471E-5

45.38 1.50403E-5

47.59 1.74167E-5

51.56 4.08000E-5

53.03 4.72500E-5

54.65 6.02857E-5

56.70 1.59375E-4

58.64 8.38889E-4

IN 718 ROOM TEMPERATURE R=0.50

54 0.50

16.25136 1.6275364E-06

16.44015 1.7795087E-06

16.53609 1.8552017E-06

16.64884 1.8795572E-06

16.79462 2.0098173E-06

16.98907 2.0663529E-06

17.17624 1.9156946E-06

17.32963 1.7270282E-06

17.51097 1.5056642E-06

17.67110 1.5405578E-06

17.71065 1.6809461E-06

17.91430 2.1540250E-06

18.15896 2.4569392E-06

18.34789 2.6162290E-06

18.53702 2.3319635E-06

18.63837 2.3249570E-06

18.71841 2.0526631E-06

18.89123	2.1769420E-06
19.22356	2.7833601E-06
19.29049	2.9979069E-06
19.57374	3.3648914E-06
19.71315	3.3135536E-06
19.78158	3.2780431E-06
19.94974	3.3198291E-06
20.09968	3.1771008E-06
20.24878	3.1383513E-06
20.48940	3.3908229E-06
20.54119	3.4295783E-06
20.71444	3.2127452E-06
20.83747	3.3177710E-06
20.94025	3.0699000E-06
21.19345	3.4177790E-06
21.32380	3.6142649E-06
21.42630	3.8228759E-06
21.59353	4.2945671E-06
21.89157	3.9082020E-06
22.03443	3.5135135E-06
22.15425	3.2137145E-06
22.37004	3.1865518E-06
22.44794	2.9533048E-06
22.54100	3.2109131E-06
22.77532	3.9370757E-06
23.04969	3.8533612E-06
23.17474	3.8185931E-06
23.31198	3.9191955E-06
23.63893	4.2104830E-06
23.82086	4.0935297E-06
24.07446	4.4407834E-06
24.57635	5.3063136E-06
25.51971	6.2362551E-06
26.58320	7.1760537E-06
27.15391	7.7447903E-06
28.66426	8.8431007E-06
29.07442	9.1236525E-06
IN 718 ROOM TEMPERATURE R=-0.20	
78 -0.20	
16.96211	5.7082656E-07
17.09812	5.9458318E-07
17.22239	6.2099514E-07
17.29070	6.4558122E-07
17.35146	6.5401531E-07
17.43128	7.3393875E-07
17.50709	8.3472145E-07
17.68952	8.3978955E-07
17.80545	8.3000043E-07
17.86920	8.5723735E-07
18.15540	7.8042211E-07
18.24465	7.5850500E-07
18.36798	8.0988752E-07
18.65040	7.9482186E-07
18.68066	8.1558926E-07

18.78465	8.7192376E-07
18.94964	9.6726637E-07
19.01956	9.7899124E-07
19.16407	9.7059853E-07
19.34078	1.0584970E-06
19.45079	9.9093472E-07
19.69200	9.7222858E-07
19.76071	1.0031370E-06
19.88074	1.0821591E-06
20.09379	1.2572548E-06
20.26375	1.1801241E-06
20.37832	1.1437410E-06
20.49874	1.1365985E-06
20.62340	1.1141369E-06
20.69107	1.0931640E-06
20.82284	1.1964648E-06
20.97324	1.3480349E-06
21.12183	1.4592297E-06
21.27421	1.4812446E-06
21.41383	1.5652270E-06
21.53343	1.5911983E-06
21.72499	1.5973550E-06
21.82639	1.5943237E-06
21.97925	1.6084346E-06
22.12841	1.6706368E-06
22.27156	1.6891837E-06
22.40462	1.6816300E-06
22.53986	1.6615038E-06
22.67035	1.6402956E-06
22.82644	1.6096674E-06
22.96623	1.6129335E-06
23.10998	1.6402879E-06
23.21643	1.7405264E-06
23.38120	1.8755454E-06
23.52663	1.9808472E-06
23.63980	2.0210293E-06
23.77898	2.0960199E-06
23.92197	2.1130675E-06
24.05252	2.0944294E-06
24.19016	2.1108922E-06
24.33021	2.1781673E-06
24.45722	2.1837923E-06
24.60534	2.2188401E-06
24.72463	2.2611196E-06
24.87170	2.3646439E-06
25.01307	2.4679812E-06
25.15751	2.5713639E-06
25.62402	2.8148095E-06
26.08323	2.9282864E-06
26.52161	3.0145832E-06
26.97822	3.0868034E-06
27.35728	3.3274132E-06
27.82157	3.6635099E-06
28.30603	3.8668850E-06

28.66247	4.0927353E-06
29.07344	4.2579627E-06
29.49522	4.5068632E-06
29.95177	4.4132671E-06
30.39682	4.6478508E-06
30.85667	4.8376205E-06
31.24861	6.0775301E-06
31.87323	5.5826022E-06
31.71487	3.4699713E-07

2) IN718700B.DAT - 700°F Crack Growth Rate data

IN 718	700F	R=0.02
33	0.02	700.0
27.46840		3.1375612E-06
27.70918		3.4762645E-06
28.02901		3.8188964E-06
28.30748		4.0669856E-06
28.97405		4.8732700E-06
29.43915		5.1457832E-06
29.96050		5.3598751E-06
30.52848		5.4845955E-06
31.12998		5.3362101E-06
31.70527		5.3967665E-06
32.00620		5.9852932E-06
32.56040		6.8180575E-06
33.06298		6.7589644E-06
33.31664		7.3134797E-06
34.00009		7.3022984E-06
34.47981		6.6005427E-06
34.78731		5.8486080E-06
35.21016		5.9527342E-06
35.45134		7.4586583E-06
35.76089		6.7246829E-06
36.00711		8.1682847E-06
36.42505		8.7191420E-06
37.48728		9.0446229E-06
38.07090		9.4606548E-06
38.16132		9.4802745E-06
39.18535		1.0984112E-05
40.10015		1.1914944E-05
44.29990		1.5661002E-05
47.78953		1.8910829E-05
50.26295		2.3641600E-05
53.21253		3.0518837E-05
57.67523		4.1244828E-05
61.73172		6.5965738E-05

3) IN718TP.DAT - 1200°F Crack Growth Rate Data

IN 718	1200F	R=0.02
90	0.02	1200
17.75409	3.5016701E-06	
17.95358	4.4837548E-06	
18.18551	6.1404025E-06	
18.53298	6.9778021E-06	
18.64746	6.6931048E-06	
18.96277	7.6664301E-06	
19.18041	7.2141752E-06	
19.59441	7.7685745E-06	
19.83464	8.3370787E-06	
19.96242	9.0006397E-06	
20.50938	9.9298422E-06	
20.72428	9.7922002E-06	
21.08781	9.6374806E-06	
21.44746	9.6261329E-06	
21.75083	8.8670586E-06	
22.07874	8.2637589E-06	
22.49829	8.6504006E-06	
22.81671	9.8082337E-06	
23.01792	1.1730738E-05	
23.31193	1.2283533E-05	
23.60192	1.3392486E-05	
24.02059	1.3846837E-05	
24.52474	1.4327838E-05	
24.92234	1.4229492E-05	
25.22016	1.4998999E-05	
25.55428	1.4458820E-05	
25.72306	1.4690945E-05	
26.10249	1.5047422E-05	
26.43709	1.4557961E-05	
26.93902	1.4616276E-05	
27.51068	1.6764296E-05	
27.95146	1.8707427E-05	
28.38058	2.2555969E-05	
28.94663	2.3579963E-05	
29.16707	2.0680274E-05	
29.22589	2.3614130E-05	
29.39758	1.9770696E-05	
29.52399	1.8744957E-05	
29.66627	1.6331083E-05	
29.81800	1.7407390E-05	
29.91182	1.5943802E-05	
30.00336	1.5024363E-05	
30.12525	1.9755280E-05	
30.37688	2.1682617E-05	
30.60363	2.2993747E-05	
30.79341	2.4128996E-05	
30.97461	2.5648102E-05	
31.13073	2.5891148E-05	
31.26193	2.4573364E-05	
31.50844	2.6205269E-05	

31.84469	2.4136521E-05
31.97589	2.3836332E-05
32.18346	2.8564800E-05
32.30235	3.1321109E-05
32.42525	3.2180378E-05
32.58421	3.4748748E-05
32.78179	3.3323355E-05
32.95143	3.1843145E-05
33.17928	2.7691329E-05
33.37284	2.9219942E-05
33.61947	3.0070956E-05
33.94834	3.2175740E-05
34.27724	3.4600806E-05
34.58897	3.2752450E-05
34.72400	3.4276742E-05
34.95217	3.3871394E-05
35.25562	3.6749359E-05
35.45329	3.7873971E-05
35.88576	3.8089474E-05
36.16578	3.8849699E-05
36.32878	3.6721161E-05
36.66291	3.4476801E-05
36.78308	3.6208905E-05
37.11049	3.7871134E-05
37.48493	4.1473268E-05
37.68554	4.2633859E-05
38.25081	4.8099340E-05
39.00181	5.0345730E-05
39.86115	5.3954114E-05
40.27755	5.4952889E-05
40.83318	5.7649497E-05
41.25254	5.9801278E-05
41.76591	6.7207584E-05
42.27051	7.0853028E-05
42.54718	6.8713023E-05
42.88615	7.3297815E-05
43.29356	7.5601696E-05
43.68134	7.9602592E-05
44.40952	9.0290872E-05
45.68718	1.1660739E-04
IN 718 1200F	R=0.50
81 0.50	
16.26015	3.9262127E-06
16.45657	4.2621477E-06
16.67182	4.5767711E-06
17.07905	5.1115021E-06
17.32133	5.5799042E-06
17.49597	5.6787153E-06
17.77078	6.1254827E-06
18.10201	6.1552960E-06
18.57576	5.9843828E-06
18.79165	5.9780950E-06
18.93759	6.6652938E-06
18.98514	6.5151958E-06

19.04827	6.6352386E-06
19.81951	1.3688890E-05
20.17444	1.0990672E-05
20.45852	6.4551682E-06
20.66438	3.7373277E-06
20.62990	1.9800168E-06
20.30280	4.0556074E-06
20.76352	8.8122652E-06
20.88280	8.6325290E-06
21.11331	9.1667798E-06
21.27290	9.6620761E-06
21.60443	9.8418068E-06
21.76226	9.8523797E-06
21.86716	9.7010125E-06
22.11894	1.0144651E-05
22.32392	9.8284918E-06
22.52926	1.0068749E-05
22.73556	1.0899630E-05
22.96220	1.1892004E-05
23.17138	1.1901209E-05
23.34521	1.2062170E-05
23.48926	1.2362027E-05
23.75911	1.1824555E-05
23.94229	1.1952456E-05
24.14355	1.2892498E-05
24.40446	1.3017670E-05
24.61538	1.3468428E-05
24.78034	1.3789941E-05
25.11017	1.5408845E-05
25.24848	1.6852166E-05
25.51501	1.7076798E-05
25.70332	1.8120727E-05
25.90279	1.7599441E-05
26.18563	1.7330274E-05
26.30258	1.7511404E-05
26.58441	1.9039158E-05
26.74544	2.0154203E-05
26.90702	2.0589405E-05
27.16782	2.1546995E-05
27.33065	2.1655400E-05
27.54719	2.1291464E-05
27.76915	2.1643531E-05
27.90303	2.1966855E-05
28.16090	2.3776205E-05
28.36324	2.5533331E-05
28.54615	2.4830057E-05
28.73815	2.6296919E-05
28.90283	2.6824237E-05
29.19908	2.7241680E-05
29.59660	2.8782286E-05
29.85490	3.1074058E-05
30.41652	3.6263686E-05
30.84043	3.6103982E-05
31.11146	3.5522295E-05

31.28746	3.7009948E-05
31.63894	3.5406239E-05
31.81690	3.2854681E-05
32.16970	3.3236400E-05
32.61694	3.5551227E-05
32.98472	3.7506132E-05
33.29748	3.9616210E-05
33.64482	4.3420769E-05
34.07959	4.2647232E-05
34.51037	4.5260549E-05
34.78811	4.8167698E-05
35.36721	5.1327450E-05
35.44781	5.2038456E-05
36.51294	6.0314305E-05
36.85562	6.5650020E-05

4) DAMINYDKC.DAT - Yield Strength and Fracture Toughness Data

IN 718 Temperature vs. % Room Temperature Fty and Kc

9

78	1.00	1.00
200	0.97	1.01
400	0.95	1.03
600	0.93	1.05
800	0.91	1.07
1000	0.89	1.10
1200	0.81	1.12
1400	0.54	1.14
1600	0.30	1.16

5) DAMINEFYD.DAT - Effective Yield Strength Data

IN 718 Larson-Miller Data

24 25

14.0	1.0
16.0	1.0
18.0	0.99
20.0	0.96
22.0	0.92
24.0	0.90
26.0	0.83
28.0	0.78
30.0	0.72
32.0	0.67
34.0	0.60
36.0	0.53
38.0	0.48
40.0	0.42
42.0	0.38
44.0	0.32
46.0	0.29
48.0	0.25
50.0	0.22
52.0	0.19
54.0	0.16
56.0	0.12
58.0	0.10
60.0	0.08

6) DAMINRSO.DAT - Overload Shut-Off Ratio Data

IN 718 RSO

2

78.0	1.00
1200.0	0.7083

APPENDIX C

ADVANCED FIGHTER LOAD AND TEMPERATURE SPECTRUM

There are 1000 missions in the advanced fighter spectrum. Each mission contains 16 load cycles and lasts for 1 hour. The temperature profile for each mission is the same. However, the peak and valley loads change from mission to mission.

Peak and valley loads were distributed to resemble the exceedance curve of a current Air Force fighter. The exceedance curve has 16,000 load cycles per 1000 flight hours, and a mission length of one hour. Therefore, each mission should have 16 load cycles. These 16 cycles were divided among seven mission segments. Ranges for both peak and valley loads were then assigned to these segments. One thousand missions which identify actual peak and valley loads, were defined by randomly assigning loads within each defined range. The number of loads in each mission segment were counted to tailor the load-time profile to meet the exceedance curve. This method results in a slightly sequenced load history in which all of the loads above 100 percent limit load occur in the first 400 missions.

On the following pages, the full spectrum is listed for the first mission. Peak and valley loads are then listed for each cycle in all 1000 missions in terms of percent test load.

1 mission - 60 minutes (16 load cycles)

Step #	Peak (%)	Valley (%)	# of cycles	Temperature (F)	Cycle Time (sec)	Total Time (sec)
1	54.1	2.8	1	78.0	300.00	300.00
2	36.5	13.5	1	610.0	400.00	700.00
3	40.3	14.3	1	600.0	400.00	1100.00
4	48.3	3.4	1	590.0	400.00	1500.00
5	58.3	13.7	1	650.0	67.50	1567.50
6	56.3	16.1	1	700.0	67.50	1635.00
7	68.9	7.2	1	750.0	67.50	1702.50
8	72.1	11.0	1	800.0	67.50	1770.00
9	84.8	-21.0	1	300.0	60.00	1830.00
10	65.2	4.0	1	780.0	67.50	1897.50
11	59.6	7.9	1	750.0	67.50	1965.00
12	79.7	3.2	1	780.0	67.50	2032.50
13	51.8	14.8	1	750.0	67.50	2100.00
14	34.1	7.1	1	590.0	600.00	2700.00
15	38.7	19.7	1	610.0	600.00	3300.00
16	76.6	0.4	1	78.0	300.00	3600.00

Figure C-1. Table of Peak and Valley Loads for First Advanced Fighter Mission

Figure C-2. Table of Peak Loads for Advanced Fighter Spectrum

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	54.1	36.5	40.3	48.3	56.3	56.3	68.9	72.1	84.8	65.2	59.6	79.7	51.8	34.1	38.7	76.6
2	50.6	25.0	49.1	45.5	69.0	55.5	77.9	60.8	108.1	65.0	77.5	52.7	60.8	38.5	33.8	56.6
3	64.4	27.1	38.2	49.5	75.5	83.5	58.6	58.6	89.8	65.9	59.7	70.7	55.0	33.1	34.5	78.2
4	61.0	41.5	28.7	41.4	73.4	57.3	63.8	52.3	84.4	75.7	56.8	63.2	59.9	30.5	36.2	67.7
5	63.9	44.9	29.6	32.6	63.7	69.2	83.4	62.5	84.1	60.9	79.3	64.5	72.4	43.8	31.2	63.6
6	79.7	43.1	45.0	28.6	60.3	73.2	56.0	58.7	82.1	69.2	76.8	50.4	55.1	38.4	41.1	54.0
7	72.0	47.6	32.7	43.1	79.0	62.5	54.0	83.5	101.2	50.9	67.8	74.8	50.6	33.5	49.9	53.5
8	70.7	27.1	36.3	37.3	70.9	71.9	50.2	62.9	82.0	71.4	58.7	77.2	56.3	28.7	36.6	59.5
9	77.8	34.3	43.5	33.7	60.5	74.6	68.4	70.4	86.5	72.2	53.2	78.9	78.3	30.2	33.3	69.9
10	61.2	32.3	43.6	30.3	69.7	54.7	54.6	67.1	81.6	53.5	61.8	50.5	65.8	28.1	32.6	69.4
11	69.6	46.2	35.6	39.6	70.6	79.1	62.5	61.2	107.4	75.7	51.4	78.2	56.0	47.3	45.6	76.6
12	76.7	39.5	35.8	27.8	74.4	54.9	54.9	57.7	95.6	51.7	74.0	51.1	77.7	49.2	35.0	70.6
13	65.5	41.1	35.6	28.5	59.7	61.6	54.4	78.1	108.1	78.1	66.9	67.9	56.4	33.6	47.5	68.4
14	52.7	46.3	34.3	32.3	55.9	68.1	84.4	75.2	85.4	77.6	71.3	63.7	78.1	39.0	46.6	51.2
15	53.1	43.8	47.4	25.4	66.7	50.2	75.1	57.4	85.0	70.8	62.3	67.2	54.2	48.7	45.9	71.7
16	73.9	41.9	38.5	28.9	63.3	52.4	84.2	74.1	99.6	57.8	78.0	67.1	75.4	33.7	41.4	60.7
17	79.3	45.6	27.9	37.7	83.4	55.4	63.1	59.6	86.1	50.4	78.6	59.2	76.3	37.7	44.6	54.3
18	74.7	32.6	25.2	34.9	84.0	67.9	77.7	63.2	98.6	78.4	63.3	61.9	61.3	41.5	34.1	57.8
19	57.5	29.7	25.5	44.6	60.6	78.0	59.1	58.8	99.2	69.1	59.7	69.1	75.8	34.8	28.9	72.3
20	66.5	34.0	26.0	40.0	60.9	61.2	61.0	57.6	93.7	52.8	57.9	76.8	73.0	26.9	42.8	75.5
21	60.2	27.0	49.0	40.9	65.6	60.7	59.4	67.9	87.1	68.0	75.2	76.3	52.6	47.0	25.2	63.4
22	73.5	47.6	40.0	44.2	54.8	60.0	83.9	59.3	107.9	74.2	74.8	77.1	76.5	49.3	48.6	54.6
23	71.7	25.1	44.4	46.6	68.7	73.2	53.7	57.9	100.6	51.4	59.5	77.4	56.5	30.9	26.6	53.0
24	71.2	25.6	45.0	48.3	83.0	54.1	62.3	72.9	92.1	77.5	65.7	64.9	64.2	45.6	34.2	78.9
25	59.4	41.2	41.6	29.3	55.3	70.6	75.7	64.5	98.3	74.8	67.8	79.5	69.9	42.9	27.8	51.3
26	63.6	28.9	41.7	26.4	75.7	69.7	65.7	50.5	99.9	66.8	62.8	64.8	72.6	32.1	41.0	59.7
27	70.4	49.4	31.5	34.3	62.7	56.9	73.6	73.6	87.9	75.3	64.5	79.9	78.6	46.6	29.4	66.0
28	65.3	31.8	46.7	32.2	54.4	60.6	63.7	63.8	110.1	77.2	68.0	61.6	51.6	32.6	41.2	56.2
29	72.1	37.1	42.2	35.8	79.2	78.5	56.6	50.5	106.8	51.4	73.0	66.0	71.6	38.4	37.6	72.6
30	71.9	47.5	37.0	48.4	61.9	69.3	52.3	59.5	96.6	55.6	52.7	60.5	74.5	28.2	37.8	65.2
31	73.0	30.4	38.7	37.6	79.6	70.2	59.3	60.4	82.7	63.1	59.4	75.5	71.3	46.6	39.7	74.1
32	59.8	27.6	30.1	37.0	57.5	60.0	52.6	68.8	98.5	69.9	77.7	56.5	67.6	32.3	39.7	50.9
33	62.4	44.2	48.3	47.6	60.0	64.4	72.2	53.3	113.4	51.5	74.3	76.0	73.1	32.3	28.7	71.2
34	75.9	37.7	25.5	39.5	56.7	60.5	76.7	67.9	114.6	69.8	53.5	65.1	50.7	41.0	36.7	65.6
35	70.1	32.1	35.2	28.2	72.9	51.5	76.5	84.1	81.8	79.4	51.3	55.5	76.1	39.0	28.7	62.4
36	58.3	31.9	38.0	28.5	61.2	66.4	57.4	82.8	104.1	65.7	70.0	61.6	76.9	32.5	49.5	68.0
37	77.1	36.2	26.0	45.9	51.9	84.7	79.0	57.1	110.6	69.7	75.0	70.8	67.4	48.3	39.9	76.3
38	77.2	30.0	35.5	36.0	67.2	75.4	83.0	51.1	107.2	70.8	51.4	58.9	69.6	30.3	28.5	74.6
39	70.2	31.9	37.1	39.0	79.7	76.3	58.1	59.7	96.0	56.6	66.3	54.4	56.2	31.9	48.5	64.2
40	70.3	39.0	44.4	32.0	61.8	73.1	66.5	55.6	100.3	70.2	76.6	68.4	51.8	25.1	25.2	76.0
41	66.8	44.4	44.8	44.5	76.3	60.0	60.1	64.6	99.0	64.6	79.3	69.5	55.8	48.4	40.9	63.2
42	67.5	26.6	41.0	32.3	65.3	82.0	71.6	65.3	106.0	56.6	66.3	62.7	79.6	26.0	27.2	62.6
43	77.2	42.0	26.8	41.7	82.0	74.9	61.4	75.0	90.4	77.4	76.8	71.2	53.2	46.6	36.3	74.9
44	61.3	41.4	33.9	43.7	51.2	60.7	73.3	71.1	104.5	76.4	52.7	76.7	56.0	49.9	42.2	59.6
45	64.4	29.5	44.7	36.5	60.1	56.0	63.9	76.3	107.9	64.7	70.4	66.3	51.7	40.5	42.0	64.0
46	65.5	45.0	40.4	37.9	73.1	61.0	64.0	81.1	93.0	68.2	56.9	61.1	69.4	29.1	49.4	62.8
47	58.5	48.8	39.9	33.2	53.2	50.5	51.6	77.8	95.7	63.3	77.3	61.1	64.1	41.1	35.6	66.8
48	69.4	48.4	25.9	39.7	77.6	65.7	77.6	65.9	95.7	78.6	72.0	54.0	77.7	27.9	47.9	55.2
49	57.8	38.6	40.0	47.9	70.6	78.1	65.3	50.2	81.6	62.1	51.4	50.8	77.1	29.0	34.8	64.2
50	70.6	47.3	41.2	36.2	55.2	72.6	70.6	55.5	108.2	66.7	63.9	69.2	67.7	35.0	33.9	57.1
51	54.6	43.8	42.4	39.6	51.8	65.6	52.0	50.3	108.7	67.1	54.3	53.5	71.6	28.5	39.6	78.3
52	68.8	31.6	49.1	48.3	64.0	61.6	56.8	72.7	104.2	69.3	54.0	79.8	78.7	36.6	27.2	58.1
53	57.1	35.0	39.8	35.7	82.3	72.0	71.5	61.4	99.1	54.3	57.5	72.4	63.0	38.5	38.8	77.2
54	78.1	31.2	31.6	49.5	70.6	79.3	61.0	69.5	104.6	68.6	75.8	65.4	75.6	31.9	37.3	68.6
55	75.4	43.6	32.4	26.7	61.9	52.1	73.0	82.5	111.1	68.4	59.4	63.5	72.4	25.6	47.6	70.3
56	68.3	39.2	26.1	45.6	55.0	82.1	73.5	63.9	114.0	66.9	55.9	77.5	65.1	29.4	43.3	76.1
57	71.9	47.1	34.6	28.3	61.7	52.7	63.9	84.9	105.5	64.7	63.3	67.2	79.8	48.3	47.5	54.9
58	75.3	47.0	47.4	48.2	61.7	83.0	61.8	67.2	80.7	55.9	66.6	68.1	52.6	28.4	31.1	59.4
59	57.9	31.7	35.1	36.7	66.5	68.2	58.5	73.1	99.5	59.0	70.7	58.6	55.7	47.6	26.1	59.3
60	71.4	41.0	47.8	49.1	71.0	76.8	63.7	63.5	106.3	71.3	59.4	65.1	54.4	31.5	39.6	76.7
61	69.0	42.0	34.0	33.9	68.1	54.7	83.7	71.7	105.3	75.1	72.8	52.5	52.3	33.0	46.7	59.8
62	66.3	35.6	26.1	43.5	67.9	60.2	52.0	69.3	89.2	63.5	50.7	52.5	70.5	37.8	47.4	75.0
63	70.4	32.2	46.8	49.3	62.6	60.8	61.8	55.6	88.0	51.9	66.4	65.4	63.7	25.4	29.2	77.1
64	65.9	28.4	25.8	43.9	51.2	51.4	53.8	70.9	110.1	78.4	74.4	54.0	60.3	38.0	32.8	64.6
65	64.9	31.9	41.3	25.8	54.1	77.2	73.1	76.8	96.2	70.6	75.9	63.8	79.5	36.1	30.5	63.8
66	78.2	44.1	31.6	46.3	83.3	51.4	62.0	67.0	112.9	70.9	78.8	72.7	75.9	37.4	38.8	65.4
67	56.6	47.5	25.4	48.4	68.7	53.7	77.1	57.2	93.2	56.7	78.6	60.5	68.7	46.5	48.9	63.2
68	60.7	29.3	28.4	29.2	68.3	62.8	78.7	72.3	82.3	61.6	75.1	51.9	78.9	35.1	32.4	72.2
69	61.3	30.9	32.1	35.7	60.5	60.3	76.1	51.5	94.9	69.7	69.1	59.1	69.0	48.5	29.8	71.3
70	61.1	28.4	47.4	50.0	78.5	65.7	65.2	84.4	99.7	77.6	73.2	61.5	58.9	34.1	28.2	52.2
71	55.1	34.5	36.5	46.7	81.2	69.5	77.4	75.7	87.9	67.1	61.2	52.7	60.0	42.2	43.3	66.3
72	54.2	40.9	45.6	31.6	76.9	60.8	84.9	79.3	101.5	66.4	67.9	57.3	69.3	28.4	28.0	61.3
73	50.5	40.4	38.0	31.0	51.7	69.0	82.3	73.2	86.7	62.7	77.7	57.9	64.6	29.8	30.0	78.6
74	70.9	37.7	26.8	30.5	53.0	61.3	62.3	84.2	97.4	52.7	64.4	68.2	68.1	36.7	28.5	67.5
75	72.6	46.9	47.3	44.1	63.1	63.2	67.7	64.3	102.6	61.3	64.1	65.7	54.0	33.3	39.6	71.7

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
76	71.2	35.9	38.5	25.8	79.3	65.9	53.7	56.6	95.6	71.9	70.6	72.4	55.5	48.9	28.0	69.5
77	60.2	49.4	31.1	37.8	64.3	82.4	81.2	52.5	113.9	69.6	61.3	71.9	73.0	39.5	42.4	71.4
78	70.8	28.2	41.4	40.3	68.2	79.3	71.3	53.7	83.9	70.8	79.3	54.2	71.1	45.5	38.6	65.7
79	67.0	35.1	30.1	44.8	55.1	68.0	72.0	77.0	96.6	62.4	75.7	68.7	72.2	40.7	43.9	62.6
80	75.3	31.1	36.6	25.1	70.6	59.0	61.0	64.9	89.7	77.3	76.0	68.2	65.5	39.5	38.1	78.3
81	55.6	32.5	32.5	43.1	56.8	56.6	73.2	53.3	105.8	79.2	51.9	79.0	68.9	32.7	39.0	78.6
82	67.1	41.4	37.1	25.2	64.7	60.1	53.5	64.1	85.9	66.4	68.0	71.7	75.8	39.0	49.6	52.6
83	67.0	42.0	48.3	40.1	60.4	78.5	58.4	67.0	98.3	69.1	76.2	59.6	56.3	49.1	45.0	67.2
84	58.7	32.3	35.9	45.8	56.8	70.3	64.3	74.1	81.0	75.8	60.6	74.8	70.9	40.0	34.2	69.4
85	55.9	47.4	28.1	31.5	82.0	80.8	53.6	73.9	106.9	66.6	65.5	67.0	79.9	26.5	34.8	77.6
86	53.4	25.4	38.0	45.5	53.8	52.2	63.7	79.5	112.9	61.5	70.6	60.2	58.9	29.0	41.5	64.0
87	59.7	44.1	37.4	40.0	75.8	56.3	66.3	67.5	100.7	77.8	62.9	63.5	67.3	37.4	26.8	54.3
88	68.7	27.4	47.8	26.4	57.2	55.7	81.8	72.3	100.7	79.0	57.9	64.8	79.1	31.9	43.2	63.3
89	54.5	47.3	38.1	26.6	61.2	67.8	73.0	55.5	81.4	57.6	57.8	57.8	62.3	45.5	30.7	52.1
90	55.0	25.9	32.3	36.5	53.8	62.7	60.8	65.7	82.8	67.0	60.8	58.4	64.0	40.0	37.1	50.9
91	65.5	46.6	26.2	45.2	77.2	84.8	83.3	59.9	97.3	76.2	53.8	77.8	63.5	47.0	46.1	74.1
92	78.1	33.4	28.9	28.6	51.4	72.5	53.4	50.5	104.1	58.4	69.3	74.3	56.5	35.7	45.5	51.5
93	67.9	48.6	44.8	27.5	56.9	56.4	84.9	83.3	84.2	56.2	61.2	62.0	68.0	49.7	39.4	79.5
94	50.8	29.0	32.1	40.8	62.9	72.2	75.4	55.7	80.3	60.7	66.5	64.5	52.1	34.5	29.7	55.9
95	74.7	25.7	39.4	35.5	72.5	76.9	82.5	78.8	107.5	56.3	50.7	59.6	78.8	36.2	26.6	74.2
96	69.7	29.4	44.2	32.5	55.9	54.4	71.8	74.8	89.5	79.0	56.2	68.8	72.8	48.9	28.4	56.4
97	60.5	41.2	45.4	42.8	56.7	78.1	80.2	69.1	82.8	74.6	78.7	51.9	74.4	37.9	29.0	57.5
98	79.7	44.8	28.6	34.6	57.9	79.6	76.7	61.1	107.0	57.4	58.3	71.5	61.5	27.4	25.8	58.3
99	50.6	33.1	32.2	47.0	51.9	68.6	64.7	52.7	101.9	64.1	63.2	72.9	63.8	27.5	38.4	78.1
100	55.2	46.3	27.3	49.8	84.7	65.7	63.8	79.0	92.6	67.6	78.4	64.4	60.1	41.7	29.5	53.8
101	57.6	44.7	33.3	35.1	51.6	75.4	79.6	63.0	106.2	53.6	55.6	67.7	60.5	36.2	37.9	74.8
102	59.9	42.4	41.4	43.3	73.3	51.9	56.2	51.2	92.4	70.2	55.4	71.8	79.2	31.1	37.1	52.2
103	70.2	43.0	27.9	34.1	51.4	84.5	68.3	57.9	95.4	58.9	75.4	77.5	64.0	47.5	46.8	54.9
104	54.2	49.5	36.3	28.2	81.7	65.4	52.7	57.4	110.9	77.3	78.6	54.7	78.5	25.9	43.3	56.8
105	62.9	34.8	41.4	41.5	78.7	76.4	80.8	60.8	114.5	56.0	70.4	51.1	69.6	38.7	45.3	53.3
106	73.1	28.7	47.4	40.4	53.0	51.3	72.2	72.9	115.0	50.3	55.8	75.0	64.2	25.8	26.2	60.2
107	73.0	28.6	30.0	39.2	50.3	75.2	67.4	54.3	95.3	69.5	57.1	56.5	64.0	35.9	40.2	74.3
108	66.9	37.7	45.8	28.5	61.8	73.4	68.2	84.5	96.1	70.7	72.4	70.4	57.0	49.8	33.4	71.9
109	63.9	37.2	46.3	35.1	52.4	55.8	67.2	56.2	105.5	50.1	53.0	54.2	57.4	42.2	35.4	53.8
110	71.4	44.4	39.8	38.7	60.6	67.3	51.0	79.4	106.0	74.7	62.3	67.7	50.9	46.5	28.9	57.5
111	56.5	47.0	35.5	45.4	55.2	81.5	60.2	52.3	94.2	76.6	64.2	60.8	73.6	29.2	25.5	50.8
112	79.4	31.6	30.5	47.5	52.7	58.3	58.5	53.0	80.2	70.0	79.0	70.6	59.9	48.4	41.8	67.4
113	55.1	25.9	33.3	49.0	70.3	62.9	84.4	57.3	105.6	71.5	79.7	66.2	57.1	48.4	28.1	69.7
114	57.1	47.0	34.3	38.6	63.4	59.6	83.5	75.7	80.4	74.6	52.3	70.2	51.8	25.4	34.9	64.6
115	67.0	39.2	34.9	30.1	84.7	61.8	59.6	53.5	95.8	78.6	55.8	76.4	52.7	44.4	31.0	68.6
116	64.3	46.9	35.5	34.7	65.9	67.3	69.2	73.7	109.1	64.2	65.7	70.2	58.5	46.8	46.0	68.4
117	78.7	30.7	42.3	36.7	81.8	60.4	75.6	77.6	108.2	75.8	69.8	52.7	58.9	41.0	33.8	56.5
118	62.8	44.5	45.4	41.1	65.0	51.9	61.3	59.3	83.1	72.8	68.8	50.9	65.3	25.5	28.3	58.4
119	79.9	42.5	34.7	38.6	60.5	50.7	52.0	71.7	88.8	73.2	79.7	69.7	57.8	43.8	41.3	67.1
120	66.8	26.6	42.0	38.9	84.1	84.7	84.7	80.5	98.5	58.5	58.4	52.5	65.0	26.0	27.5	72.9
121	75.6	47.8	30.2	39.6	56.1	67.3	65.6	54.7	88.9	64.6	76.3	60.9	50.3	37.2	37.0	54.3
122	78.7	49.9	39.8	37.2	80.5	63.6	76.4	72.3	106.1	72.2	61.1	60.7	78.0	25.2	27.2	61.6
123	69.9	38.2	36.0	48.6	56.7	84.1	76.4	64.7	83.4	52.9	52.8	54.7	53.2	45.9	32.2	79.6
124	67.0	49.7	29.3	40.0	59.2	78.6	73.9	77.0	100.1	70.2	72.9	73.3	66.8	28.2	27.1	58.7
125	51.7	38.0	42.1	45.1	58.1	64.8	71.2	83.5	85.9	70.0	60.6	62.8	60.4	48.0	39.4	71.0
126	74.5	45.1	38.1	30.6	52.1	54.7	68.1	72.4	83.5	61.8	61.1	77.5	78.0	25.0	41.3	70.8
127	71.7	43.8	49.5	26.5	79.2	60.2	67.6	83.7	108.7	78.4	52.8	62.4	61.7	48.9	41.6	53.6
128	53.6	45.1	33.4	49.6	59.6	51.7	70.0	75.7	92.7	58.5	70.4	66.1	78.2	32.3	34.3	59.1
129	68.7	31.6	28.3	35.3	56.4	56.8	59.3	75.6	94.1	51.7	73.7	61.4	67.9	41.1	36.8	79.7
130	56.1	45.1	32.2	48.4	60.0	70.6	56.2	62.0	90.8	65.2	62.3	70.9	78.7	33.8	42.8	63.9
131	62.7	34.4	40.1	30.0	62.3	56.1	51.4	53.1	101.7	56.3	63.3	70.3	67.6	40.5	49.1	68.7
132	52.1	48.3	42.2	28.4	67.4	51.3	79.7	71.5	91.9	77.9	75.6	66.1	65.6	42.1	39.6	65.3
133	53.7	46.2	31.8	48.5	71.5	58.2	83.2	77.6	95.0	73.3	58.0	60.7	66.4	48.7	44.5	61.1
134	78.7	46.3	37.6	26.6	72.3	52.6	68.8	68.2	98.4	60.5	54.9	63.2	63.8	32.0	26.6	65.0
135	59.2	36.8	41.6	47.2	68.7	62.3	53.3	65.2	97.5	53.0	77.2	80.0	69.3	36.7	40.7	67.3
136	70.5	31.4	49.1	30.5	58.8	72.6	51.3	64.3	105.6	76.4	62.8	78.7	69.2	36.7	30.7	52.7
137	53.9	31.7	44.9	45.1	77.3	74.9	68.3	54.0	107.0	52.9	68.9	64.7	62.8	40.5	43.4	67.8
138	69.0	42.3	43.1	27.2	72.7	71.9	56.5	56.1	93.4	68.5	71.4	73.5	53.1	26.4	40.2	58.1
139	66.7	45.7	34.0	35.5	64.2	80.2	74.7	50.6	101.8	61.1	61.8	54.8	66.0	46.5	38.1	60.0
140	56.5	47.2	34.5	27.8	81.7	82.5	58.7	60.5	104.8	73.9	55.5	74.0	74.2	28.1	25.1	54.8
141	51.5	48.9	42.7	25.3	71.6	67.3	64.2	83.3	80.2	71.8	65.8	74.3	77.2	29.7	41.3	75.3
142	55.2	45.0	37.0	31.7	79.9	63.1	71.1	73.1	98.6	76.0	52.4	56.7	54.5	43.2	42.9	60.8
143	61.2	26.0	39.6	29.6	56.7	82.7	73.7	63.4	98.7	73.6	50.8	62.9	50.8	31.7	47.0	77.7
144	75.5	25.8	40.1	26.5	58.9	82.6	58.7	78.4	82.3	55.4	77.0	67.3	65.2	35.5	40.7	76.7
145	63.4	35.5	38.7	34.7	68.6	73.7	57.8	63.5	80.7	79.9	58.3	69.4	79.1	29.2	47.5	73.2
146	55.4	44.7	25.9	36.5	76.3	72.9	63.9	85.0	93.2	65.0	55.3	65.3	57.8	25.1	47.6	58.4
147	58.8	45.4	31.8	40.5	59.8	61.4	52.8	53.6	81.7	54.4	51.2	77.6	57.1	40.6	45.8	72.4
148	55.8	46.9	45.1	41.9	79.9	72.6	84.1	52.3	89.2	78.7	65.7	50.7	57.5	32.6	29.6	59.4
149	59.8	48.6	25.8	35.0	75.1	69.6	67.5	51.3	93.9	67.5	61.2	77.3	50.7	41.1	48.7	55.2
150	56.6	43.1	42.8	39.2	57.7	61.8	83.0	81.5	103.1	59.1	79.0	79.2	59.3	25.0	40.7	50.7

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
151	76.2	39.2	27.2	42.3	68.4	71.1	57.4	75.4	93.7	54.1	77.5	58.1	78.9	47.5	30.6	79.1
152	78.0	45.3	39.2	38.9	66.2	83.8	50.2	55.2	98.9	73.9	70.6	51.0	75.1	43.2	34.8	79.9
153	68.7	48.7	37.7	45.6	72.7	54.3	62.6	64.6	90.8	53.5	71.2	69.3	54.6	28.8	32.9	71.4
154	66.2	36.9	28.5	30.2	58.1	55.9	79.1	64.3	92.9	77.1	51.8	77.9	76.9	31.4	42.5	64.6
155	58.9	46.6	45.5	36.8	62.1	67.5	67.2	84.5	84.8	76.0	61.1	65.6	62.5	43.5	34.2	67.0
156	67.4	28.1	38.7	29.4	66.0	68.6	72.3	58.5	91.0	58.1	62.6	71.3	60.4	32.4	27.6	56.2
157	70.9	28.2	32.1	40.0	52.1	65.6	63.3	54.7	92.1	58.9	76.3	76.5	67.2	27.1	44.1	72.1
158	55.1	32.2	26.3	48.5	59.8	58.7	54.7	56.0	98.9	75.4	76.6	71.2	61.8	46.8	42.4	70.1
159	61.0	31.3	26.8	36.1	57.5	55.3	55.5	71.7	99.5	71.1	59.9	77.0	69.6	43.2	28.8	63.4
160	60.8	35.7	44.7	47.0	81.6	60.5	63.6	84.8	82.1	69.9	62.2	52.1	58.0	28.1	37.8	65.2
161	63.2	30.6	25.6	39.8	63.8	81.0	59.4	84.8	88.9	58.4	68.5	71.2	52.0	48.2	43.4	59.4
162	57.5	31.1	35.0	31.8	53.1	72.2	66.8	74.3	89.3	72.3	67.6	64.8	60.6	49.0	42.7	54.8
163	62.1	34.6	43.3	30.3	81.0	71.5	71.7	83.3	103.6	78.1	76.8	76.8	73.0	25.3	37.0	57.0
164	66.9	32.9	32.6	43.8	67.7	75.4	59.0	60.6	99.4	51.5	78.4	55.5	57.8	42.0	35.4	59.8
165	69.5	26.0	40.5	34.4	61.9	57.0	76.0	52.1	103.7	69.3	51.3	54.2	53.0	34.2	45.7	77.3
166	62.6	37.9	31.5	30.8	66.1	64.3	57.6	50.3	102.9	69.0	72.0	53.5	65.6	25.2	27.9	71.8
167	76.3	35.3	36.7	34.9	73.6	73.1	66.7	52.8	103.9	56.2	62.4	71.1	54.1	32.8	29.0	68.8
168	79.7	34.4	36.2	31.8	54.5	71.7	72.7	84.7	90.9	77.7	76.7	76.7	53.5	46.8	26.7	53.1
169	71.8	29.7	38.8	28.2	60.5	67.9	70.1	63.0	99.2	50.3	60.2	78.7	50.6	49.7	27.5	56.9
170	56.2	37.2	34.1	44.7	82.1	57.1	75.1	63.1	89.9	77.0	71.3	79.5	61.1	47.6	33.4	76.4
171	73.9	47.0	34.4	36.5	83.6	76.4	84.0	75.3	83.2	77.6	73.9	73.0	71.8	45.4	32.8	53.9
172	60.5	35.8	31.0	34.1	65.6	76.1	77.1	67.5	90.8	54.0	69.6	64.0	61.8	33.2	47.2	51.2
173	68.6	28.5	46.0	26.4	76.6	55.4	54.7	51.8	96.1	79.6	79.6	67.7	74.9	27.7	37.1	53.7
174	78.4	41.0	33.7	37.7	60.4	62.2	73.5	69.3	87.0	76.3	64.1	79.0	55.6	34.5	43.3	52.4
175	52.9	29.0	40.0	28.0	78.3	73.8	74.3	73.6	82.9	75.6	50.2	67.7	66.2	43.5	46.2	79.9
176	69.1	36.3	46.2	39.7	70.8	57.3	76.2	80.1	100.0	51.7	51.0	63.9	74.4	26.5	31.9	51.8
177	64.8	35.0	34.1	39.3	79.5	77.6	58.6	69.4	82.1	59.1	71.9	66.5	51.6	38.8	37.9	75.9
178	58.8	25.6	32.6	49.9	54.2	55.9	84.4	79.0	80.6	50.6	70.8	59.4	56.2	40.6	36.9	54.0
179	55.9	26.5	46.6	26.9	70.8	77.6	62.1	68.6	101.6	79.4	78.2	57.6	68.9	28.4	45.8	64.7
180	57.3	34.9	33.1	46.0	75.1	58.8	72.1	64.2	99.8	63.3	65.8	73.0	63.9	39.4	30.5	57.5
181	72.4	28.6	32.4	49.0	76.4	56.3	74.4	67.7	92.6	56.1	70.0	71.8	54.6	31.6	31.4	69.5
182	76.6	30.8	37.5	29.9	50.3	74.3	63.4	75.7	82.7	55.3	58.3	62.7	69.9	39.4	30.1	69.4
183	51.1	30.6	44.0	47.3	53.4	75.5	51.1	68.1	92.8	59.9	55.1	61.7	53.2	26.2	42.6	78.8
184	61.3	39.1	32.3	30.5	80.5	52.9	75.1	71.4	97.9	79.9	57.6	60.1	58.5	30.0	33.7	56.7
185	66.0	26.1	28.2	32.8	61.3	68.5	74.1	73.4	83.0	78.8	72.2	75.9	50.4	39.2	45.1	61.5
186	50.7	27.1	40.1	39.3	70.0	80.0	51.7	58.3	99.4	54.4	79.8	71.0	51.1	39.5	49.0	64.5
187	75.6	45.6	31.5	40.0	54.7	65.6	57.9	69.6	100.0	52.2	58.0	72.0	50.3	29.8	44.6	71.9
188	61.7	48.4	45.0	26.6	84.0	60.5	68.7	51.4	92.7	79.5	61.6	50.5	56.9	36.4	38.4	65.6
189	63.0	31.0	46.7	34.3	72.9	68.7	71.8	74.8	85.7	56.4	69.1	60.9	67.3	48.7	48.6	63.3
190	66.5	43.9	37.8	44.8	68.8	67.4	67.6	81.2	104.4	72.2	62.1	78.5	55.2	48.4	31.5	63.4
191	64.9	28.7	27.5	33.6	64.9	73.9	74.1	57.9	90.8	70.7	53.9	70.8	75.9	36.2	29.8	69.5
192	68.2	46.1	40.6	29.0	77.8	56.2	75.2	65.2	82.0	59.2	54.7	57.3	67.1	45.9	46.6	70.1
193	57.4	33.7	32.8	30.5	67.0	67.4	74.2	76.8	85.8	56.8	50.6	64.2	62.8	32.7	26.6	77.2
194	73.3	45.6	36.1	39.3	80.9	61.8	82.3	67.8	104.8	84.6	62.9	79.5	71.0	45.3	48.5	58.3
195	55.2	36.2	32.1	45.5	72.2	77.7	64.9	73.6	83.5	69.6	62.2	70.9	67.4	32.8	33.3	55.8
196	58.9	37.5	43.6	33.7	51.1	66.0	51.9	66.6	87.8	72.6	52.5	55.5	62.9	45.3	42.2	65.2
197	54.8	41.2	31.7	38.1	73.4	81.5	54.0	74.8	103.9	61.4	69.5	65.5	53.8	34.6	33.4	62.0
198	63.0	42.9	40.0	25.4	66.3	75.9	59.6	62.8	104.4	70.8	61.1	54.0	78.9	30.9	44.4	77.3
199	76.7	32.6	37.6	45.0	60.9	75.1	75.5	68.0	93.9	72.9	57.0	78.0	53.9	27.6	49.0	64.6
200	57.3	44.7	34.0	25.3	73.3	57.4	68.4	62.3	84.3	57.3	57.8	72.7	52.8	43.6	42.4	61.2
201	52.1	25.2	48.9	33.3	66.1	83.1	58.8	72.3	91.1	67.5	50.2	54.2	59.1	31.9	45.4	72.4
202	52.6	40.9	47.5	34.0	82.2	71.4	69.3	62.1	104.1	78.1	74.4	54.2	70.2	47.7	36.2	58.8
203	75.6	29.1	48.3	26.7	63.9	84.0	84.7	62.8	95.1	64.8	56.4	65.7	76.9	41.0	26.7	51.0
204	60.9	45.3	45.4	39.2	76.8	74.4	69.8	75.5	94.9	70.8	53.2	56.9	71.3	40.5	29.0	69.2
205	53.9	42.4	42.5	33.5	78.8	71.6	74.2	67.2	96.1	55.6	66.0	73.0	56.5	25.7	33.6	79.2
206	50.4	44.6	49.5	46.4	68.1	81.4	56.5	67.2	100.7	73.1	59.4	57.1	56.5	34.3	43.9	57.0
207	51.1	49.0	43.3	30.4	81.1	59.5	55.3	61.8	84.8	78.8	62.9	61.2	68.2	35.3	49.9	75.9
208	72.6	31.5	28.7	30.5	73.1	77.6	51.8	71.1	89.4	58.6	70.0	61.7	56.7	45.8	28.2	50.9
209	76.8	45.5	44.9	31.3	66.4	77.9	75.0	65.0	93.1	67.4	74.7	53.0	78.3	49.6	29.5	67.7
210	64.1	25.2	33.7	26.7	61.1	71.5	79.2	71.2	81.6	56.1	71.6	51.4	60.0	36.1	36.8	54.2
211	73.6	33.3	40.8	31.1	62.5	71.6	83.9	54.1	87.3	79.0	53.4	54.5	75.0	25.9	47.8	72.0
212	60.9	43.2	49.1	26.4	84.1	70.1	60.1	72.8	97.6	64.0	53.4	71.4	64.3	25.2	43.4	75.8
213	77.8	31.0	25.8	38.5	52.4	52.6	52.4	78.3	82.4	69.4	59.8	71.6	79.7	49.7	49.1	59.5
214	60.7	27.4	44.5	35.5	71.3	64.8	64.8	58.1	104.5	72.0	55.2	73.0	50.5	27.4	35.6	67.8
215	69.8	29.5	35.1	29.1	72.2	83.2	74.8	68.5	104.9	55.1	70.0	56.1	68.8	28.1	39.5	63.6
216	51.0	31.3	32.0	29.8	61.6	70.7	62.5	69.5	93.9	58.2	50.6	75.1	65.2	35.1	29.0	52.4
217	55.5	36.0	26.3	35.2	55.2	78.7	62.4	82.9	82.8	50.2	78.9	77.4	60.6	35.9	38.6	58.9
218	69.6	38.3	42.9	25.8	54.3	63.3	52.9	72.4	91.1	65.5	74.1	77.1	60.4	48.2	48.5	55.6
219	64.2	49.3	40.9	36.7	51.0	84.8	54.9	52.9	81.0	68.0	76.0	71.5	57.2	27.3	43.4	69.1
220	66.4	25.9	43.6	26.3	79.6	60.6	56.4	72.0	84.9	61.2	79.0	70.3	67.8	35.3	31.3	58.7
221	54.3	29.2	33.2	35.9	50.6	71.7	66.1	76.6	87.1	59.8	60.8	54.3	79.0	45.1	38.0	54.7
222	64.0	33.3	48.3	48.3	64.3	60.0	80.8	58.6	93.0	78.6	60.8	64.5	79.1	46.3	34.1	71.0
223	75.8	47.7	48.5	31.9	72.1	78.8	84.5	57.9	102.3	71.7	60.5	50.3	60.3	25.9	34.2	62.0
224	60.0	47.4	44.3	49.8	66.7	66.9	59.6	64.0	89.7	78.8	55.2	51.5	62.4	45.2	39.5	74.2
225	71.9	48.4	49.8	38.6	71.8	61.0	69.4	66.4	81.8	68.0	50.8	79.7	63.1	25.9	31.2	64.1

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
226	57.4	34.1	30.8	39.1	56.5	59.7	62.5	50.9	92.6	51.7	72.6	78.1	59.5	45.6	46.3	72.4
227	54.3	43.2	41.1	43.0	81.7	71.8	71.4	74.6	88.6	65.3	69.9	59.1	63.9	46.1	34.9	73.5
228	68.5	48.3	35.0	49.5	61.4	64.3	50.5	66.3	92.0	67.1	72.4	67.9	71.0	43.1	43.4	52.4
229	62.4	45.3	31.9	27.7	73.3	68.0	78.1	50.4	90.5	60.9	58.9	53.2	55.9	28.4	31.1	60.4
230	64.2	47.6	42.1	35.5	74.0	68.8	79.6	59.5	82.7	62.2	77.9	59.8	59.9	45.1	30.8	62.0
231	65.7	44.5	39.3	48.1	83.4	77.4	79.5	74.2	102.7	69.6	53.5	60.6	75.7	43.8	30.2	71.4
232	71.1	43.6	28.9	37.8	51.7	60.0	63.0	82.9	92.6	68.8	57.2	68.0	67.8	47.5	33.9	75.9
233	64.0	33.8	43.7	39.4	80.6	51.0	75.0	80.0	81.7	75.2	53.9	64.7	71.9	33.0	30.2	61.1
234	59.3	25.9	39.5	32.3	72.3	58.2	51.2	50.1	82.9	65.2	61.0	71.1	75.4	45.8	27.3	73.4
235	61.7	36.1	32.1	26.3	52.3	78.0	63.3	57.9	81.3	69.2	51.3	71.8	67.8	37.3	46.5	66.4
236	56.5	41.2	33.5	40.1	70.4	80.8	58.6	77.9	88.1	52.3	71.5	71.7	60.6	43.6	29.2	77.5
237	79.3	44.0	25.6	46.0	77.7	70.3	77.1	77.7	97.9	50.5	73.6	69.5	65.9	31.9	46.5	51.1
238	59.4	44.7	35.0	33.2	73.9	54.6	77.5	72.4	80.7	79.9	57.5	71.1	50.8	26.1	33.3	56.9
239	66.5	26.8	44.9	29.4	71.8	80.4	67.2	52.9	105.0	58.7	64.6	68.8	75.0	47.9	29.3	55.4
240	52.9	36.5	26.8	42.1	56.1	62.3	61.6	63.6	84.2	72.8	76.7	56.8	76.1	27.1	45.6	77.3
241	52.8	30.9	41.3	28.0	79.1	54.0	77.3	81.8	101.6	58.3	77.7	65.7	57.9	31.7	45.8	79.5
242	55.0	36.4	42.4	45.7	65.0	60.7	82.7	78.0	81.7	73.7	71.5	56.5	69.2	39.2	32.8	55.6
243	77.5	40.1	29.3	27.8	51.3	69.3	83.3	67.1	98.2	62.4	78.6	76.3	73.1	41.5	32.6	75.4
244	62.7	30.5	37.7	28.2	51.3	58.7	72.2	80.4	103.0	76.5	53.3	50.5	51.4	40.3	40.4	52.0
245	57.9	37.8	43.7	46.9	55.2	72.9	52.2	77.8	82.4	73.1	55.5	53.1	53.6	47.2	44.1	75.7
246	55.1	26.4	43.9	38.0	77.4	68.8	67.2	84.9	94.6	70.0	63.0	67.4	72.2	43.4	38.0	66.0
247	54.0	32.8	48.5	48.5	51.4	68.3	52.4	58.4	89.3	71.9	70.2	77.9	77.4	44.7	49.6	50.9
248	69.5	26.6	33.7	26.2	54.9	78.4	83.1	71.1	84.7	61.4	68.7	64.7	52.6	33.6	32.1	63.8
249	60.5	36.2	31.9	29.5	59.8	57.0	78.8	69.6	80.3	62.6	55.3	74.1	51.2	30.4	47.7	79.2
250	63.3	43.1	27.7	35.9	77.6	68.8	55.4	68.5	100.1	64.0	54.8	70.7	54.9	37.3	46.9	78.7
251	54.2	37.2	34.8	35.5	51.1	51.0	68.8	61.3	87.3	67.6	57.7	63.4	53.5	42.2	41.3	63.1
252	58.7	28.4	38.9	31.0	54.5	64.3	61.8	67.4	83.5	66.0	65.8	74.8	50.8	44.0	42.9	77.2
253	74.1	37.0	27.2	31.0	54.0	80.5	81.1	52.6	82.3	78.7	69.8	70.2	62.0	31.7	47.5	62.3
254	59.4	50.0	38.3	36.1	65.2	68.6	61.4	60.0	80.4	52.9	71.8	62.4	60.3	30.3	37.1	60.5
255	60.5	44.4	32.7	43.4	74.4	78.7	69.9	70.7	104.4	52.4	61.1	63.6	60.9	43.9	27.5	53.3
256	64.0	45.6	35.7	39.7	71.9	76.6	83.4	73.4	83.6	73.3	53.4	64.6	63.1	43.0	41.9	56.5
257	54.6	30.6	29.2	47.8	52.4	74.0	80.1	56.0	92.1	59.3	64.8	77.3	70.6	46.4	38.3	63.0
258	74.1	25.8	33.5	26.7	65.1	68.2	55.2	51.8	101.6	73.7	64.3	54.9	74.4	38.5	34.7	58.9
259	50.9	32.3	43.9	46.7	52.6	68.7	62.0	80.2	102.0	59.5	51.0	55.7	55.7	30.9	37.3	68.7
260	65.0	47.2	44.2	33.2	59.4	55.8	59.6	57.4	88.7	77.9	62.6	67.0	74.4	37.2	34.1	65.0
261	72.3	44.5	48.8	43.4	67.6	77.7	69.6	75.1	91.3	67.1	74.7	63.2	58.8	26.0	47.2	58.1
262	54.6	48.9	40.2	32.1	62.0	78.4	71.7	82.3	89.8	76.0	71.1	76.9	58.3	32.1	30.2	65.2
263	53.1	34.7	43.1	35.1	69.9	76.4	71.7	76.4	95.3	74.8	77.6	71.6	57.0	39.7	41.5	56.3
264	71.6	31.3	36.6	33.3	61.2	63.0	68.7	67.6	104.1	74.4	66.5	70.0	77.4	27.6	32.7	77.4
265	65.7	30.0	46.4	43.3	62.0	79.8	71.0	75.7	88.5	75.6	73.2	63.7	73.6	25.6	48.9	79.7
266	59.6	34.2	42.5	40.5	68.9	51.3	52.3	76.9	94.5	73.8	68.3	73.9	70.7	33.5	32.5	66.6
267	61.8	40.7	43.4	43.0	77.1	68.1	53.1	58.6	101.6	65.0	51.0	71.9	71.7	39.3	42.3	56.9
268	61.6	31.3	49.2	28.0	76.5	79.3	53.8	75.8	96.6	77.7	79.7	54.2	70.4	39.9	32.4	71.7
269	60.8	35.4	46.9	26.8	56.0	63.1	73.3	63.2	94.1	76.6	58.5	76.9	58.0	36.9	31.2	50.7
270	76.7	29.4	35.9	36.2	55.2	73.6	68.9	62.2	80.2	53.0	69.4	50.8	75.4	33.0	30.9	53.9
271	71.4	48.5	29.1	50.0	62.0	70.5	58.1	71.6	97.8	57.0	71.7	65.8	54.8	37.4	25.9	71.2
272	69.6	41.5	33.5	46.5	52.0	70.3	61.9	74.0	87.1	74.1	63.6	61.3	53.7	29.0	29.2	77.0
273	58.7	44.2	29.5	31.4	55.4	67.2	63.5	56.1	100.3	66.5	72.3	72.5	76.9	35.5	44.8	62.0
274	53.1	31.6	50.0	32.2	61.7	77.4	51.7	58.9	99.3	53.2	64.7	55.8	61.2	28.0	32.0	65.5
275	68.9	26.8	32.0	35.6	51.2	50.1	59.2	63.1	88.9	54.8	65.5	55.9	62.8	38.4	26.0	55.8
276	72.3	31.2	36.7	47.3	76.3	67.2	82.3	75.8	91.1	77.1	52.9	79.7	68.0	46.0	46.2	52.0
277	71.1	32.5	42.7	43.7	78.7	56.4	78.3	54.2	84.7	54.8	51.0	56.2	57.4	30.8	31.5	55.0
278	58.0	45.8	48.1	33.9	67.2	79.1	80.2	50.8	87.0	56.9	60.5	60.6	72.2	32.6	39.0	58.2
279	59.8	34.7	32.9	30.6	79.6	64.7	71.7	65.4	90.6	58.2	78.2	58.6	52.7	30.3	41.6	53.9
280	72.8	25.2	25.0	30.5	74.6	50.6	60.0	62.3	103.9	62.9	77.9	71.4	56.6	44.4	32.2	53.8
281	55.3	35.5	40.8	48.9	79.6	67.4	63.1	61.1	99.1	76.1	77.0	58.4	54.6	32.5	29.2	57.3
282	60.9	33.5	31.6	27.0	58.4	64.9	61.6	52.1	94.8	51.4	73.0	65.7	58.3	26.3	33.8	71.8
283	62.3	33.4	43.9	45.7	68.8	80.5	62.2	75.1	96.8	59.5	75.5	79.8	63.8	49.3	29.6	64.5
284	60.7	46.3	40.8	40.9	62.9	66.9	59.2	51.6	100.1	77.8	62.3	69.4	57.5	33.8	41.9	72.8
285	52.4	36.3	37.9	49.5	54.0	63.3	80.4	66.0	90.6	77.2	65.9	56.4	61.8	43.5	28.5	52.5
286	50.6	25.9	38.7	35.4	68.4	50.4	77.3	60.8	104.3	52.2	60.6	53.7	76.5	42.8	42.6	61.7
287	52.8	29.3	46.2	42.1	64.0	55.2	66.4	58.8	82.1	66.4	79.2	61.2	71.3	38.4	29.7	62.4
288	65.8	46.5	39.8	27.4	53.5	70.1	79.5	75.4	98.8	78.6	53.0	62.3	76.4	45.4	41.1	73.0
289	65.9	49.8	41.4	26.6	68.4	59.4	71.3	77.0	92.7	69.6	76.5	73.7	72.7	37.0	46.5	66.6
290	76.7	25.0	29.0	26.1	68.3	58.7	71.2	71.4	84.9	69.8	65.6	76.7	57.5	34.7	38.7	55.6
291	79.4	40.7	36.0	38.6	79.8	60.0	57.7	75.5	91.8	64.3	62.0	76.9	54.4	33.0	30.5	50.8
292	70.0	35.2	48.3	29.6	72.1	59.2	56.1	64.4	89.4	50.4	65.8	61.3	62.9	45.9	32.6	78.4
293	55.8	39.9	29.0	31.0	75.2	68.4	82.6	69.6	97.9	59.8	51.8	50.8	79.6	32.6	40.0	74.8
294	73.4	33.5	32.7	34.7	80.0	71.9	71.9	83.4	88.5	77.2	75.4	52.4	57.4	25.9	26.0	60.1
295	52.1	25.4	34.0	33.4	67.8	73.7	61.3	76.8	103.9	72.2	68.5	77.0	72.4	44.6	26.5	57.0
296	62.9	27.3	43.1	32.4	59.7	52.8	57.4	69.8	91.7	61.3	70.1	77.4	69.3	48.6	44.2	66.1
297	68.6	39.6	46.8	38.7	77.0	61.4	75.3	68.4	97.2	60.0	57.3	64.0	66.1	44.1	33.2	67.7
298	67.6	29.9	36.4	26.8	58.3	75.8	79.7	60.2	98.9	77.1	69.2	76.2	79.0	45.8	37.4	57.0
299	57.6	37.6	31.2	38.5	82.7	51.6	58.8	73.8	86.8	58.3	54.9	73.2	62.0	46.2	43.0	64.3
300	70.4	41.4	26.4	37.1	76.5	61.3	58.5	79.7	96.0	64.9	73.6	66.9	65.2	29.5	29.7	69.4

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
301	55.1	40.3	36.6	29.4	56.7	60.3	58.4	75.7	94.3	79.4	60.1	67.0	75.1	44.9	42.3	51.4
302	60.2	45.9	32.7	29.8	66.9	82.5	84.2	53.5	80.9	66.3	75.4	62.1	72.2	42.9	48.1	57.9
303	56.4	42.5	39.2	31.9	66.5	63.7	68.5	52.8	93.5	52.0	72.6	73.0	50.0	35.5	41.6	71.1
304	61.9	27.3	45.3	31.3	54.7	77.3	57.4	60.7	99.3	51.2	68.3	68.7	78.1	41.7	38.2	78.4
305	60.0	28.2	38.6	47.9	60.6	84.0	63.5	61.9	95.0	56.6	56.7	50.8	55.5	33.7	48.1	72.9
306	69.6	39.9	38.1	39.7	50.4	65.5	77.1	69.1	96.0	62.4	50.4	79.0	58.9	44.5	34.5	59.9
307	68.1	33.0	40.3	30.4	79.3	51.6	74.1	83.5	94.6	55.8	67.4	50.7	52.8	31.1	29.5	79.4
308	61.6	36.7	34.8	42.5	65.5	67.3	79.3	56.8	92.1	57.0	68.2	68.0	79.8	41.4	29.6	77.5
309	74.4	48.4	28.3	34.9	81.6	58.6	63.4	75.5	90.3	61.0	66.7	60.5	62.2	37.5	43.6	65.5
310	69.8	45.8	40.5	27.7	84.8	51.6	66.9	79.1	84.0	68.0	60.9	68.4	77.2	28.7	29.2	54.3
311	59.9	49.9	37.6	39.4	55.2	67.3	77.1	66.4	104.1	77.5	54.3	64.7	80.0	27.5	27.9	55.7
312	61.9	38.7	45.0	44.2	56.0	75.3	78.8	51.9	91.1	58.4	64.2	61.8	63.7	49.1	31.2	73.3
313	54.4	25.9	26.9	44.7	80.7	78.5	67.8	51.9	95.2	73.9	63.3	63.3	74.4	40.3	38.1	64.3
314	78.3	30.3	49.0	28.7	64.1	68.0	62.4	56.1	89.0	54.6	75.9	71.7	64.2	43.4	49.0	58.4
315	77.3	32.9	45.0	26.7	57.6	74.9	68.6	59.0	91.6	56.3	68.6	61.9	62.0	32.7	48.0	64.4
316	62.0	44.5	29.2	29.8	67.8	78.0	84.5	68.7	90.7	78.9	57.7	65.9	63.1	45.5	45.1	75.7
317	77.8	46.6	29.6	32.7	53.7	63.8	79.7	52.2	86.8	60.2	73.6	78.3	78.1	49.6	48.3	61.6
318	79.4	34.0	46.9	41.1	74.4	56.5	64.5	75.8	96.0	77.0	62.1	60.3	52.0	46.6	42.8	50.3
319	75.5	33.0	36.7	31.8	54.4	58.5	71.4	63.6	89.1	73.6	71.2	67.9	51.9	29.2	32.0	65.3
320	77.1	26.6	33.3	43.9	61.8	82.3	68.6	82.5	104.0	57.1	72.2	67.0	74.0	36.2	32.5	55.1
321	58.6	37.2	29.8	27.3	63.5	76.2	54.0	63.6	84.7	71.1	73.1	53.6	77.3	28.6	48.9	55.6
322	71.7	32.6	31.6	34.8	78.5	71.0	65.0	60.2	82.5	64.1	50.6	61.8	69.2	28.5	48.1	73.2
323	60.3	42.3	26.7	46.4	80.3	65.1	80.6	73.2	98.6	62.7	60.1	73.6	63.3	34.1	48.8	75.8
324	64.4	45.0	38.4	40.8	81.2	77.7	79.3	73.2	83.2	69.0	70.6	67.5	60.0	44.6	38.4	56.2
325	79.7	33.4	49.3	40.0	51.9	65.5	82.6	68.8	94.8	79.7	51.0	67.1	56.6	44.7	33.6	62.1
326	73.2	49.0	25.2	43.2	69.3	60.5	68.7	59.5	83.6	79.6	78.7	58.6	78.7	29.8	42.4	79.6
327	58.5	42.3	40.1	49.0	52.3	71.8	76.9	56.1	85.3	70.1	68.5	57.2	62.3	41.0	45.0	54.2
328	54.7	49.0	40.6	48.9	74.4	51.6	51.7	51.3	93.7	75.0	54.5	75.3	67.4	41.4	39.4	71.4
329	64.2	37.8	45.8	28.8	76.3	64.6	73.4	50.1	84.1	73.6	58.3	73.1	74.0	35.5	45.5	59.6
330	63.7	49.3	49.3	30.5	83.5	72.0	63.7	67.7	99.3	59.8	57.9	56.8	53.6	36.4	27.3	67.7
331	52.2	42.6	48.7	27.4	75.2	66.4	76.6	60.3	91.4	72.0	55.3	57.9	60.2	48.8	36.3	66.9
332	50.7	36.0	41.0	31.2	84.4	64.0	80.9	55.8	83.3	62.6	70.2	66.4	62.7	34.1	44.4	71.4
333	54.7	46.5	49.7	42.8	55.7	56.6	76.9	54.2	94.7	79.9	70.9	56.1	69.7	30.3	25.6	56.0
334	53.6	48.1	32.1	31.7	80.2	82.3	57.7	69.0	100.0	57.9	61.8	67.6	74.7	44.0	44.5	73.7
335	66.8	29.4	48.1	41.6	65.7	80.6	67.0	76.1	86.6	64.9	60.7	60.4	62.8	32.6	34.8	60.6
336	51.3	41.6	35.3	38.0	72.5	64.0	68.4	83.7	99.0	64.6	76.9	63.9	68.7	49.6	26.1	57.4
337	56.8	43.8	43.6	45.3	82.2	81.7	84.8	68.4	88.8	72.5	56.5	78.1	68.5	47.3	30.6	78.9
338	50.9	39.7	28.6	44.7	82.0	75.9	84.9	73.4	88.0	50.1	71.6	59.5	65.3	48.9	49.4	51.7
339	59.6	28.1	35.5	25.3	67.1	62.3	65.5	62.8	95.3	66.7	52.3	52.2	52.4	33.2	30.8	62.3
340	77.6	40.0	38.3	47.7	70.2	50.9	80.4	72.3	90.4	72.1	63.2	52.5	79.8	30.7	34.7	52.0
341	56.8	28.0	42.9	33.7	56.4	54.8	79.8	68.8	88.7	56.3	74.4	63.5	55.8	26.1	49.6	67.6
342	63.1	25.9	28.4	38.6	83.1	54.1	64.1	82.6	93.0	60.3	72.4	77.7	78.0	27.5	49.1	53.2
343	69.0	30.0	25.5	35.7	80.0	80.1	54.8	50.8	97.7	67.1	56.2	79.1	74.8	31.0	46.5	58.9
344	64.1	34.3	48.9	32.9	59.2	51.6	82.7	58.5	98.6	63.1	72.1	72.0	63.2	37.6	39.5	58.8
345	57.2	44.2	38.8	39.3	68.8	79.8	61.5	60.8	87.7	71.6	53.5	50.0	55.0	38.9	38.9	67.4
346	50.9	37.3	39.7	39.3	76.3	72.2	81.5	61.5	85.7	66.5	53.6	75.2	54.8	41.0	40.1	64.7
347	51.9	48.4	43.2	43.7	83.5	55.6	72.9	58.2	94.5	60.4	71.1	63.9	54.1	25.5	29.9	69.1
348	76.7	48.9	47.7	35.8	55.2	66.2	56.0	58.0	99.2	55.0	56.9	61.3	69.1	35.2	49.6	67.1
349	61.8	31.8	48.2	26.9	52.9	70.0	70.1	58.3	88.3	61.1	55.4	73.8	57.4	28.3	29.9	75.7
350	72.4	41.3	38.4	33.6	53.5	62.5	50.5	76.2	86.0	58.6	55.9	52.1	57.2	37.3	28.6	51.8
351	58.6	42.8	39.6	33.6	58.8	76.8	65.1	79.3	92.0	72.2	72.6	56.6	70.0	28.1	43.2	57.8
352	78.9	31.7	27.9	31.7	69.8	72.4	79.5	56.7	89.9	78.0	71.9	52.6	66.3	31.3	36.2	57.8
353	63.6	30.6	49.5	40.3	74.3	80.6	66.7	79.9	84.1	79.7	66.4	69.1	53.0	39.1	43.0	68.7
354	51.7	39.7	43.4	31.6	54.6	60.5	64.9	76.1	83.3	61.5	78.2	59.6	66.0	39.0	35.6	72.5
355	79.0	46.9	45.6	26.4	63.0	82.7	70.3	82.2	89.7	57.7	68.4	64.9	61.3	43.4	47.3	72.4
356	65.0	41.1	46.8	46.4	63.6	63.0	52.0	67.5	94.3	65.8	70.5	67.9	78.9	38.8	25.5	53.1
357	75.7	45.6	38.1	30.3	80.2	83.7	74.5	80.5	86.1	77.6	50.9	79.6	71.3	34.4	36.2	60.8
358	51.6	30.1	33.9	30.3	66.8	72.2	67.8	71.4	98.6	68.8	51.5	54.3	77.7	39.9	36.2	79.1
359	73.0	29.2	48.0	29.9	68.6	82.9	74.7	83.4	88.6	71.6	78.4	55.5	55.8	36.4	41.8	60.4
360	52.7	30.5	44.4	28.1	64.7	83.3	50.1	80.7	86.0	71.1	56.8	54.6	70.3	38.6	32.0	79.7
361	76.5	46.7	44.0	26.4	54.1	84.9	63.5	74.5	88.6	60.3	73.6	57.3	58.7	44.4	45.1	66.2
362	77.6	44.2	46.7	25.7	80.1	55.7	78.4	88.8	88.1	63.4	75.4	69.6	72.9	31.2	38.9	69.1
363	65.7	34.2	49.6	47.5	83.5	62.3	83.6	76.9	99.1	59.1	61.1	76.3	61.0	36.9	34.5	78.5
364	51.1	36.4	47.8	26.9	55.6	51.7	72.8	79.6	80.2	66.9	56.1	57.6	68.1	43.5	38.7	75.8
365	76.8	46.8	49.4	48.3	71.1	57.0	66.6	82.4	93.3	65.1	72.3	74.0	63.2	32.3	48.6	57.0
366	77.7	35.4	35.3	28.0	53.6	69.5	80.8	59.9	95.2	79.6	61.8	68.7	69.0	38.8	45.3	57.5
367	64.9	25.7	38.9	25.8	51.5	82.3	74.1	77.5	83.1	77.5	73.8	68.8	74.4	29.3	34.0	68.6
368	62.3	49.5	49.8	41.9	75.4	58.6	55.7	77.7	96.4	72.6	67.0	61.1	59.7	31.1	25.2	50.1
369	65.3	44.8	48.8	42.3	58.1	52.9	84.6	72.6	80.4	68.3	63.7	79.8	58.4	36.5	35.8	54.7
370	57.8	27.0	32.1	38.6	70.5	82.3	54.9	54.8	89.7	66.0	78.2	53.6	64.1	37.1	33.0	52.6
371	75.6	33.6	38.3	39.1	76.3	78.9	57.5	66.4	89.7	66.5	54.0	53.2	54.5	31.1	30.2	75.1
372	59.6	34.8	26.3	46.1	80.8	68.9	57.9	73.8	86.3	55.4	68.8	65.2	62.6	49.2	36.1	50.0
373	53.4	25.8	47.2	46.7	53.4	69.1	56.0	84.7	97.3	57.4	53.5	60.0	79.6	48.8	45.3	58.1
374	73.3	47.4	30.0	32.7	51.0	52.7	69.6	73.5	85.7	68.2	52.0	79.3	70.0	39.7	28.3	63.9
375	69.3	45.5	26.8	32.7	80.5	61.7	67.3	67.2	81.3	68.6	60.6	58.9	51.8	25.1	29.6	78.5

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
376	56.5	38.9	43.3	36.6	67.6	58.3	81.2	78.0	88.4	78.9	53.1	68.5	70.2	37.0	48.7	69.2
377	69.1	46.4	29.1	33.3	63.3	53.7	84.4	54.4	94.6	77.3	64.6	53.5	68.7	32.6	48.0	76.0
378	76.5	29.5	25.6	25.1	75.5	50.8	72.1	74.9	83.5	57.6	68.6	51.8	66.6	45.1	33.3	75.5
379	50.9	35.6	32.0	36.8	56.9	65.4	64.6	61.2	89.7	68.8	76.6	69.2	72.2	40.0	47.6	65.5
380	66.5	35.0	45.8	31.8	56.9	59.7	50.3	81.6	96.4	79.3	55.1	51.8	63.1	44.8	26.9	68.7
381	51.4	35.3	28.2	34.7	78.5	79.9	81.8	59.3	92.3	51.4	74.1	78.7	78.8	35.7	40.9	58.5
382	61.3	29.5	40.7	39.1	54.0	54.7	51.4	54.1	88.7	58.8	65.3	65.8	73.9	48.7	47.6	76.5
383	59.1	35.1	27.1	48.9	75.1	69.0	59.3	63.9	83.8	73.5	74.7	55.0	62.2	26.5	36.5	66.0
384	51.8	36.3	40.6	29.7	72.2	63.3	79.4	84.8	81.0	57.5	65.5	60.0	79.0	29.2	43.3	74.1
385	74.3	29.4	30.0	37.0	65.4	61.0	82.2	64.6	81.9	52.7	78.4	56.0	68.3	36.0	38.9	73.4
386	58.2	27.5	36.6	32.1	57.8	56.6	61.9	79.3	90.5	75.7	75.4	75.1	73.8	25.8	27.4	59.6
387	72.4	29.6	26.6	44.8	76.9	66.5	72.6	83.0	98.4	66.3	52.0	73.2	56.6	27.7	26.4	60.0
388	55.1	46.9	46.5	38.2	78.1	65.3	57.5	62.7	94.4	61.6	65.8	65.9	76.3	27.5	48.5	62.2
389	71.9	37.9	42.0	48.7	73.0	70.1	77.0	54.5	92.5	54.5	53.3	50.5	71.3	42.0	26.4	51.3
390	63.3	25.8	48.5	48.1	82.3	64.1	54.3	75.4	81.7	76.8	67.3	78.3	57.2	35.7	47.6	72.4
391	78.4	33.3	41.3	27.8	76.3	51.7	52.7	82.2	85.7	61.1	57.8	74.5	60.7	38.6	35.0	76.8
392	59.8	34.7	36.0	46.8	73.0	68.9	67.9	67.8	82.5	54.0	75.3	70.4	69.5	49.8	32.7	52.7
393	58.7	31.9	42.8	36.3	63.6	64.9	67.5	60.4	86.1	65.2	55.2	76.5	52.6	28.2	29.3	69.0
394	59.0	46.6	35.9	48.4	58.8	56.7	52.5	81.1	94.3	76.5	59.4	61.8	61.3	32.9	44.1	61.8
395	79.6	29.6	39.1	38.1	77.5	78.5	71.0	66.8	84.8	70.1	69.9	53.5	71.1	41.8	41.1	72.4
396	71.5	35.0	45.6	46.1	81.1	63.2	62.8	68.6	90.6	53.9	78.5	63.4	75.8	27.3	47.6	51.4
397	77.3	26.4	26.4	29.5	70.8	75.4	76.6	75.1	86.9	86.3	67.7	76.2	60.9	25.5	37.5	63.5
398	70.7	42.8	48.0	48.6	66.4	64.2	51.9	77.1	89.5	61.8	57.8	72.0	78.9	41.2	45.6	67.6
399	65.2	38.9	39.5	39.4	81.0	71.0	73.5	76.7	82.7	59.2	77.7	58.3	66.7	42.3	41.4	59.8
400	7.8	41.6	47.3	32.1	73.9	81.6	61.2	71.4	93.8	59.4	70.7	76.5	57.3	38.3	36.2	62.2
401	51.9	40.0	30.1	33.7	64.8	71.1	65.1	69.2	89.6	54.0	57.8	78.7	50.7	48.3	30.4	76.0
402	63.7	39.5	47.6	38.7	73.2	83.7	76.0	77.1	82.8	73.8	71.7	54.4	73.0	48.6	44.0	68.3
403	70.3	40.3	43.7	45.4	52.1	81.8	78.2	51.1	90.3	75.2	79.3	69.3	68.5	37.5	34.9	75.2
404	64.6	26.3	25.3	31.2	52.8	51.6	84.4	52.1	84.7	67.7	66.2	51.7	70.7	34.3	41.1	65.8
405	63.3	26.1	44.5	49.3	54.9	62.6	71.9	69.8	87.6	78.1	51.9	67.2	58.7	39.3	48.3	65.5
406	76.5	48.0	44.2	26.8	54.8	61.9	83.5	63.9	96.0	53.7	64.8	60.3	54.5	31.0	49.7	61.5
407	76.3	43.8	46.2	41.3	84.0	54.8	53.2	68.7	98.9	56.7	66.2	51.8	51.5	32.8	28.5	70.1
408	77.7	44.5	35.5	35.9	79.2	62.2	63.3	73.2	88.1	57.1	64.2	53.9	73.7	47.7	30.5	69.2
409	78.9	38.2	29.1	42.4	79.0	84.3	82.4	84.4	84.8	60.4	64.7	78.9	51.3	47.5	37.9	69.2
410	57.6	30.9	29.9	39.0	78.8	70.9	58.8	58.9	88.6	57.0	54.4	75.5	74.0	48.4	46.3	58.5
411	57.8	45.1	39.7	34.1	79.7	84.9	74.5	81.2	81.7	52.6	66.2	66.3	60.2	37.9	32.0	71.6
412	59.1	33.3	43.9	25.3	67.3	67.5	80.9	73.2	88.5	64.3	60.8	68.9	60.5	32.2	34.8	51.7
413	57.7	37.5	26.6	28.9	59.8	58.9	54.7	80.4	89.0	52.1	78.2	50.8	60.3	31.7	49.9	55.8
414	54.3	28.2	27.5	47.7	61.8	54.7	50.5	65.5	92.0	67.6	54.7	72.9	62.4	49.7	41.5	75.3
415	50.1	39.8	25.6	38.9	50.2	82.1	84.2	55.4	88.4	78.7	75.0	59.2	56.7	38.2	37.7	73.9
416	51.8	45.5	39.5	31.3	50.6	57.1	67.6	69.3	98.2	72.2	62.4	63.1	50.8	27.2	37.2	53.1
417	58.4	39.1	34.7	45.7	50.4	82.6	69.5	51.3	90.6	57.8	68.7	61.9	68.7	34.0	41.3	62.6
418	75.2	45.2	49.7	31.9	58.7	64.6	60.6	57.2	94.3	57.5	72.2	71.5	70.2	36.5	28.3	53.4
419	74.1	25.9	25.0	46.9	82.8	81.4	75.1	68.4	88.5	64.0	54.2	60.6	61.7	37.9	32.7	62.4
420	71.5	33.8	38.4	26.7	62.7	60.7	79.5	55.6	81.5	54.8	62.2	61.4	54.6	48.1	26.7	77.8
421	61.9	33.1	25.8	40.0	68.6	54.3	51.8	84.2	95.4	58.4	58.1	69.3	63.4	40.1	38.2	73.3
422	61.7	48.3	38.5	27.1	64.4	52.4	79.1	57.1	85.7	50.6	55.2	61.8	66.4	33.5	32.0	71.1
423	68.6	39.4	33.3	31.4	71.7	75.6	54.6	56.8	87.8	50.7	73.4	59.9	50.6	31.5	42.8	51.2
424	77.8	34.3	42.2	49.4	52.4	55.9	76.7	80.7	99.5	70.6	68.5	66.3	61.6	42.3	29.8	58.5
425	68.6	27.5	32.3	49.8	82.9	52.5	53.3	61.8	81.8	57.2	67.7	51.9	57.6	44.3	43.0	73.6
426	73.4	45.3	38.2	26.1	55.5	75.0	78.1	61.2	82.7	59.3	64.3	56.6	53.2	36.9	33.1	63.9
427	69.6	26.1	26.1	29.0	63.0	61.4	74.2	78.9	90.1	71.5	65.4	59.4	69.8	40.6	34.6	76.6
428	78.1	29.8	45.8	38.0	81.7	74.6	83.7	54.0	91.4	59.4	70.4	52.7	68.2	45.2	32.7	52.5
429	78.5	40.1	27.2	38.0	75.1	78.2	56.7	74.9	87.2	57.2	72.0	73.3	56.1	36.9	40.6	76.4
430	50.9	40.3	42.4	45.6	78.3	57.1	83.2	73.3	95.0	54.0	66.8	50.1	61.4	46.0	25.3	78.5
431	67.5	46.6	38.8	41.8	82.8	55.3	59.4	57.0	86.7	66.6	71.6	53.9	73.7	36.5	28.1	64.9
432	56.3	33.5	35.6	40.4	78.6	84.1	55.5	51.4	86.1	54.2	56.7	68.9	57.5	48.8	30.2	73.6
433	69.4	48.7	33.5	26.8	63.7	54.7	71.6	57.2	90.5	60.5	69.6	58.7	57.5	25.7	26.8	66.7
434	60.4	44.0	26.2	25.7	80.2	82.9	52.5	60.1	97.7	71.3	50.8	66.5	62.0	49.8	27.5	60.3
435	56.0	48.3	39.8	46.4	50.2	74.9	50.3	59.8	81.9	55.0	65.4	64.8	52.3	46.8	32.3	72.1
436	73.2	29.0	48.0	49.0	63.5	69.7	73.8	59.6	86.8	70.9	55.1	50.6	72.6	36.3	49.0	75.3
437	52.0	45.9	46.4	47.8	52.9	80.0	83.3	80.0	94.5	57.4	52.9	58.8	69.3	30.9	25.4	55.5
438	62.3	36.9	48.0	48.8	68.6	61.6	72.5	83.4	89.8	74.3	64.1	59.7	56.5	34.2	29.5	58.6
439	59.9	32.0	48.1	47.3	72.5	67.3	69.5	61.9	82.9	61.3	67.1	66.3	54.3	43.9	31.9	78.5
440	67.6	44.1	41.6	27.9	56.8	53.6	55.7	63.7	93.6	57.1	66.6	68.2	51.2	37.3	41.0	56.4
441	52.4	39.0	45.8	34.9	51.2	73.3	62.2	55.7	96.8	57.9	67.2	71.5	53.3	47.1	47.2	79.7
442	72.7	47.2	43.9	37.5	67.5	74.3	66.6	57.3	80.2	63.7	63.0	62.7	55.4	37.4	41.9	58.3
443	66.8	33.7	47.8	43.9	55.9	69.1	67.7	62.7	92.9	63.0	50.7	70.3	52.9	32.4	36.2	66.0
444	69.3	49.7	27.2	43.4	64.9	73.6	73.7	71.2	98.2	68.1	57.3	58.1	56.4	45.7	33.8	50.3
445	58.8	34.4	32.3	46.1	70.1	59.5	67.6	81.5	98.2	52.1	58.6	54.6	53.8	28.9	40.4	70.3
446	69.5	25.6	49.2	40.3	81.2	51.3	59.8	63.6	90.6	68.5	70.8	65.8	51.8	34.0	31.3	51.1
447	68.6	36.2	32.2	27.5	56.1	52.1	52.7	60.8	93.4	56.7	56.1	53.9	71.3	27.4	28.1	53.9
448	59.3	41.1	28.6	33.0	80.6	73.7	56.5	62.1	82.1	70.4	55.0	74.3	73.2	38.3	42.8	75.7
449	56.4	25.3	48.0	42.4	82.9	65.5	81.6	69.0	88.9	63.6	55.6	69.7	61.5	48.7	29.8	76.5
450	65.7	36.0	37.3	28.6	74.3	60.6	70.2	53.1	80.3	72.6	54.3	53.8	76.9	32.6	48.1	66.1

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
451	58.0	42.7	46.2	35.6	57.0	81.7	82.6	58.3	96.7	55.3	67.6	70.8	58.1	37.8	49.5	50.5
452	63.5	29.8	41.3	42.9	74.6	81.7	55.4	84.0	92.9	52.4	72.4	62.9	60.6	36.1	32.5	75.2
453	65.7	42.5	25.2	40.8	73.7	59.7	80.5	63.1	85.0	54.1	57.0	55.3	62.0	41.9	36.4	52.1
454	68.9	25.6	35.0	43.2	58.0	50.9	59.8	74.9	95.4	74.8	57.5	74.4	56.7	25.0	47.5	60.1
455	73.2	27.1	42.2	40.1	51.7	53.0	50.4	60.7	87.8	65.3	74.7	52.4	57.9	45.4	34.5	68.5
456	66.5	29.3	38.3	46.0	67.0	63.9	67.6	67.1	88.3	73.4	54.9	51.1	63.8	32.3	36.0	68.8
457	76.3	27.7	44.4	49.6	84.0	73.2	53.1	61.1	80.3	64.3	59.4	53.5	71.7	49.5	35.4	51.5
458	75.7	38.6	46.2	42.0	82.1	55.8	82.5	54.5	88.0	72.2	64.5	74.8	68.2	36.8	36.0	66.4
459	70.0	39.2	41.9	28.3	63.0	68.2	56.7	71.7	92.5	71.1	51.3	72.2	58.9	43.8	39.0	68.1
460	54.1	43.2	26.9	29.6	83.7	57.1	65.4	52.3	85.6	53.2	52.0	65.8	72.4	34.5	43.3	76.2
461	59.8	30.3	46.6	47.1	83.8	82.6	59.2	53.6	90.2	51.5	52.9	60.6	59.6	25.6	32.9	63.0
462	62.1	43.1	39.2	32.7	50.5	63.1	66.8	84.3	85.0	50.5	59.7	70.8	61.0	28.6	36.3	66.9
463	54.2	29.1	43.1	48.5	83.0	57.4	63.3	82.6	97.3	71.9	60.9	61.0	74.6	29.7	44.7	60.8
464	63.1	35.8	40.9	48.5	73.2	55.2	72.8	64.1	91.3	73.8	71.5	61.7	59.5	26.2	47.3	54.1
465	78.0	29.1	38.9	26.4	54.5	60.2	52.4	69.9	84.6	74.3	53.8	61.1	61.8	49.3	43.0	76.4
466	63.6	40.7	40.4	40.9	73.0	53.1	74.9	50.0	96.8	58.0	54.3	74.3	53.9	47.3	45.9	51.2
467	62.1	32.3	42.9	39.1	66.4	81.5	68.2	72.1	89.7	72.9	61.9	63.7	63.5	38.4	39.3	54.2
468	54.2	42.1	39.5	45.3	73.2	62.1	72.1	54.1	99.8	52.4	70.5	72.5	70.0	28.4	38.1	56.5
469	55.9	36.8	31.4	31.9	60.9	83.2	74.0	68.2	87.3	70.2	70.0	59.1	68.2	45.9	47.5	75.6
470	62.6	41.8	43.2	25.1	63.6	50.1	55.0	74.7	82.1	71.3	71.0	63.8	63.1	27.4	49.0	59.0
471	65.1	26.5	39.1	26.0	59.5	52.3	57.7	63.0	96.9	65.9	62.5	67.3	57.2	45.2	37.5	62.5
472	71.6	45.7	40.0	38.8	68.9	61.2	53.6	52.9	91.6	52.4	65.4	60.0	68.2	33.3	26.4	65.9
473	65.1	39.2	47.9	49.5	59.7	82.9	67.9	83.5	92.1	65.0	57.9	52.5	64.8	41.9	30.8	63.1
474	66.6	39.3	44.6	43.9	67.5	83.5	61.3	73.2	82.6	50.8	51.6	68.0	56.6	41.1	30.6	70.2
475	78.0	34.2	34.0	27.2	67.0	55.4	81.8	71.6	86.4	69.0	55.7	59.5	53.4	36.7	35.0	60.3
476	74.0	25.8	47.5	44.1	66.4	63.8	70.3	56.3	80.1	67.8	58.7	62.7	51.8	45.3	44.1	63.0
477	72.6	42.8	40.8	49.0	59.4	81.8	58.5	65.3	87.2	62.6	51.5	51.4	73.4	35.0	42.4	61.2
478	53.6	27.9	27.0	41.5	74.8	59.8	66.7	59.6	96.1	74.3	66.4	64.7	72.6	48.0	35.6	60.0
479	61.1	26.4	48.5	46.3	83.0	70.0	81.0	56.8	99.5	66.0	53.3	69.9	58.6	38.9	44.2	58.4
480	75.1	49.0	42.4	47.5	83.6	55.1	53.3	68.7	88.8	66.8	56.0	68.6	61.7	44.6	26.6	77.2
481	77.3	47.5	30.6	42.9	60.1	68.4	83.4	51.7	82.5	67.4	74.7	65.5	62.9	43.2	35.0	59.4
482	71.1	32.0	28.7	39.1	54.0	58.3	80.4	68.2	96.0	52.2	55.3	65.5	58.2	46.2	30.9	67.0
483	76.2	32.1	45.3	29.6	52.5	81.7	66.5	65.9	97.6	50.9	51.0	56.0	50.4	48.7	32.9	69.7
484	74.0	47.8	42.4	31.3	64.5	83.2	59.0	52.5	89.1	65.7	59.8	55.0	74.8	38.6	39.1	60.8
485	64.3	25.5	47.7	38.1	72.8	60.9	80.2	61.6	83.8	59.8	50.6	71.9	54.4	41.8	47.5	60.0
486	67.7	44.0	45.9	40.0	63.0	51.5	53.9	69.9	98.3	50.4	51.6	68.7	51.9	41.6	41.4	70.8
487	57.5	28.3	45.6	39.2	66.1	84.8	65.9	82.1	97.8	57.5	54.1	70.9	54.6	37.4	49.7	63.0
488	72.3	41.6	36.5	49.2	84.6	50.6	80.2	68.0	84.1	51.8	58.1	68.6	51.2	32.6	39.3	73.1
489	51.6	30.3	38.7	41.5	68.2	65.8	82.5	65.2	87.2	60.0	63.2	64.7	74.8	48.8	43.9	59.9
490	60.2	28.4	31.7	33.9	56.6	52.0	81.9	65.4	86.5	67.7	61.7	55.6	55.2	34.4	34.2	61.7
491	51.6	46.4	41.1	43.2	52.7	67.2	59.1	61.2	87.7	55.8	50.3	67.5	74.2	47.0	32.7	59.8
492	67.1	29.1	37.0	30.2	63.4	55.7	58.1	62.7	81.7	74.9	57.1	59.9	59.1	33.9	47.9	52.3
493	70.8	49.8	40.8	39.0	53.4	73.8	50.0	61.7	88.4	60.6	51.8	66.9	63.4	36.5	37.4	51.4
494	61.2	25.4	47.8	26.7	83.3	62.8	53.6	70.5	96.5	56.7	56.3	59.0	68.2	33.9	34.2	71.4
495	61.6	41.6	46.9	35.5	70.4	83.2	65.7	73.8	96.2	55.6	71.7	67.4	64.0	41.9	27.4	66.2
496	72.2	37.1	28.0	27.4	57.7	66.0	53.1	69.5	88.9	51.3	52.6	53.5	63.1	39.1	44.4	73.1
497	53.3	36.5	44.0	32.9	64.1	81.3	81.2	50.7	86.0	68.3	67.8	51.4	70.9	34.3	26.3	70.1
498	65.2	39.9	36.0	33.7	52.5	58.6	51.4	61.2	99.4	71.0	63.6	69.6	71.5	25.4	44.8	62.2
499	62.0	35.3	35.5	35.5	57.9	62.2	67.9	58.6	95.6	70.1	58.1	68.3	68.7	48.3	33.5	78.1
500	79.8	25.5	44.0	34.1	56.2	70.7	55.6	69.1	85.1	74.9	71.7	74.0	66.2	25.0	39.5	77.3
501	69.8	39.9	39.8	48.0	52.4	72.1	72.7	73.5	89.2	54.7	67.8	50.1	53.9	28.9	47.4	52.9
502	62.9	40.5	44.4	43.0	65.2	72.0	64.8	55.5	81.9	66.7	64.3	56.0	70.8	42.5	50.0	65.0
503	66.2	46.5	40.0	44.8	71.1	52.1	57.8	51.5	88.8	66.6	65.9	67.2	61.3	25.5	38.1	79.8
504	60.5	31.3	49.7	46.0	84.5	74.4	73.4	61.3	93.8	63.3	50.5	52.8	68.6	26.4	30.1	76.2
505	73.9	40.6	38.3	35.5	55.4	71.6	57.9	83.4	84.8	70.6	68.5	66.1	58.1	25.5	36.5	71.7
506	60.5	31.4	33.5	28.3	61.2	67.0	61.6	84.3	86.1	53.5	73.5	70.6	71.5	38.3	40.6	58.6
507	57.5	33.3	42.4	46.7	55.3	68.1	66.4	55.3	97.7	67.1	67.3	54.1	58.6	26.6	38.0	75.7
508	67.6	36.5	41.0	44.6	69.4	68.9	56.2	73.7	83.8	62.0	55.5	50.7	61.9	36.2	43.2	64.4
509	72.7	35.2	38.9	47.4	55.2	73.1	60.1	51.4	90.6	69.6	75.0	63.8	63.5	37.8	34.0	64.0
510	62.6	25.6	39.6	37.4	60.6	68.1	73.3	58.0	99.2	73.1	65.9	66.8	64.8	40.5	46.0	62.3
511	57.7	31.4	27.1	26.0	63.2	52.5	68.4	69.4	83.5	72.6	65.9	68.7	71.7	41.3	34.2	74.9
512	50.1	38.2	43.2	40.8	64.1	84.0	64.6	52.8	83.8	51.4	55.3	72.7	71.5	47.1	26.7	62.4
513	76.4	49.4	27.7	38.2	50.6	82.0	69.4	54.4	97.6	74.6	74.2	54.1	75.0	49.4	32.0	62.8
514	63.1	34.7	37.9	45.5	58.0	68.0	63.9	61.1	87.0	59.5	66.0	62.7	67.4	35.3	40.3	59.0
515	65.1	49.4	31.2	48.4	59.1	61.4	68.0	80.1	90.3	51.6	64.9	50.9	53.0	26.2	29.5	78.3
516	50.9	42.7	49.9	37.7	81.8	73.3	57.9	57.4	93.4	72.9	74.8	52.3	58.3	28.5	48.5	58.6
517	73.2	25.0	29.9	35.2	66.2	58.9	61.2	50.1	96.1	53.0	61.5	66.6	59.7	46.1	42.5	74.5
518	71.8	46.2	31.8	26.8	80.3	57.2	61.6	68.1	80.4	67.8	56.7	72.4	51.9	35.8	38.7	79.2
519	62.3	28.3	28.5	48.3	55.4	83.5	52.8	57.9	92.6	54.7	71.6	68.3	70.4	48.7	27.8	78.0
520	73.5	25.0	48.8	33.5	57.1	65.2	53.6	63.8	98.1	69.7	74.1	60.0	51.8	41.2	43.7	57.4
521	76.0	41.7	36.9	29.4	56.4	66.6	62.4	56.4	90.5	55.8	57.5	61.7	72.7	33.3	40.2	67.5
522	50.0	37.9	45.0	28.3	69.2	51.0	54.5	55.6	95.6	67.4	66.8	57.9	60.1	49.6	35.7	50.5
523	56.4	43.8	40.4	48.3	66.0	63.5	60.6	67.9	86.8	59.0	58.5	64.7	66.0	27.1	35.6	74.4
524	58.3	49.2	25.3	49.5	69.5	64.4	53.5	55.2	83.6	60.2	61.7	65.9	70.8	48.8	35.5	66.5
525	53.7	47.5	32.4	48.3	68.7	62.6	66.6	65.9	88.1	63.7	56.4	52.3	67.3	44.1	47.1	61.2

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
526	64.3	48.0	34.4	45.4	74.2	59.2	68.1	53.6	87.2	71.8	73.9	59.8	62.5	45.3	37.7	66.0
527	55.9	36.4	29.8	46.4	61.3	74.8	72.2	68.6	93.9	62.9	72.6	64.1	68.6	32.1	47.7	58.5
528	65.3	34.7	27.7	38.6	55.2	52.3	54.4	59.3	92.0	56.2	66.5	72.3	51.8	32.1	28.5	59.7
529	71.6	32.7	38.2	30.2	64.8	57.5	54.4	73.1	86.9	68.4	52.6	65.1	74.2	31.6	25.8	69.6
530	60.3	41.1	26.6	29.7	64.9	71.0	63.8	55.0	91.0	66.8	56.0	67.8	62.8	40.0	48.6	73.9
531	77.9	33.4	26.2	46.3	55.9	73.3	70.8	56.4	90.5	56.3	73.4	67.2	73.8	26.9	38.2	53.7
532	70.3	31.1	35.0	29.8	59.4	69.4	63.5	73.8	85.2	58.3	57.7	50.1	57.3	30.1	44.6	57.4
533	72.3	49.7	46.3	43.6	52.8	56.1	68.9	62.3	97.5	72.5	57.3	59.4	51.9	45.2	47.6	55.5
534	63.2	26.9	37.0	44.6	71.8	53.5	55.8	62.5	90.7	58.2	62.6	62.6	60.7	41.1	31.3	50.4
535	53.3	31.8	28.2	42.8	69.0	51.2	71.7	58.4	81.9	57.1	73.1	55.7	68.8	39.9	26.8	55.0
536	66.1	47.0	43.2	49.8	74.0	51.8	65.3	59.1	87.9	51.1	53.2	74.6	68.6	35.7	27.5	50.2
537	56.6	26.6	31.2	46.3	67.0	65.2	69.8	57.0	98.2	61.4	50.1	74.5	70.8	41.1	42.7	70.3
538	67.0	27.3	40.6	44.5	74.9	60.6	58.2	70.8	88.4	71.0	55.0	72.0	74.1	49.5	28.2	58.8
539	63.3	33.6	39.1	48.8	74.0	53.4	58.3	68.7	86.4	57.5	69.5	51.0	56.3	43.3	32.2	56.7
540	67.2	42.4	36.4	39.3	51.0	60.4	71.2	70.7	80.9	50.6	68.3	59.9	68.9	27.0	36.6	67.1
541	55.4	48.0	40.8	28.4	60.2	70.6	72.2	73.8	82.4	63.5	63.7	51.9	55.7	38.1	46.5	75.4
542	78.4	38.2	30.3	37.3	53.3	65.5	68.6	68.4	92.3	74.5	70.0	61.7	59.8	45.2	28.0	54.5
543	77.8	46.5	29.5	44.4	58.1	56.3	55.2	56.5	88.1	73.2	73.3	50.8	52.1	44.1	28.8	71.7
544	78.8	25.6	48.9	34.9	50.8	69.0	54.6	62.4	88.8	53.5	61.3	60.0	59.0	28.9	43.7	52.3
545	65.6	37.5	50.0	26.8	51.0	61.3	70.6	53.6	86.0	50.3	62.5	55.2	56.2	26.6	35.4	74.7
546	68.6	49.8	40.0	40.0	74.7	63.2	56.8	51.5	80.4	71.2	55.4	63.4	70.0	48.0	33.3	75.4
547	52.0	29.3	31.9	49.2	74.0	54.3	60.8	58.3	91.6	73.2	71.5	69.0	72.7	37.9	41.2	76.0
548	78.3	46.9	28.6	32.5	52.5	63.7	68.5	63.6	89.8	53.6	52.8	54.5	50.6	44.2	31.1	60.3
549	72.5	40.8	48.6	30.7	64.2	66.4	71.0	67.6	86.5	51.1	64.2	60.5	58.7	49.6	39.4	76.9
550	57.9	37.5	32.2	44.8	74.0	66.8	73.2	65.6	81.7	52.9	54.0	56.6	59.9	47.0	33.9	55.2
551	78.7	30.5	30.3	45.9	74.5	70.0	55.9	72.7	84.1	65.3	74.4	64.9	65.8	30.5	46.0	71.2
552	56.7	33.8	40.5	25.3	60.9	53.6	58.5	73.5	84.8	59.2	54.7	70.7	68.0	34.4	34.4	74.0
553	58.7	38.7	28.6	32.7	60.7	65.3	70.9	52.7	87.1	57.3	59.3	73.5	68.8	49.1	46.5	54.5
554	76.5	48.6	34.6	44.6	68.8	62.5	66.8	64.4	92.5	70.4	67.1	50.6	74.5	42.7	41.1	70.9
555	62.0	45.0	36.1	25.9	65.3	56.3	53.6	54.0	83.8	70.6	57.5	71.0	64.2	43.9	28.9	70.5
556	79.6	40.3	36.7	34.5	75.0	61.6	59.5	70.3	81.6	67.6	68.3	55.9	71.7	25.7	34.0	72.3
557	79.1	47.5	29.6	48.8	60.9	73.3	72.0	71.9	85.1	66.3	63.5	57.8	65.3	48.3	32.9	50.6
558	67.0	31.1	38.5	47.8	52.1	65.0	56.2	56.4	86.3	74.3	62.4	64.6	64.7	43.4	40.1	56.3
559	65.5	35.6	41.5	48.8	73.7	65.1	70.4	61.9	90.4	73.0	68.1	74.0	64.1	28.7	47.8	65.4
560	55.2	37.8	38.2	46.9	71.0	58.7	63.3	74.3	92.4	51.1	56.3	70.4	60.9	39.2	27.7	63.1
561	61.0	30.8	43.8	32.5	58.4	52.1	70.2	69.9	86.2	73.6	57.3	52.1	54.1	29.0	49.2	63.3
562	58.0	44.2	27.1	32.2	66.5	66.3	60.4	68.3	81.8	64.7	71.9	50.3	53.5	25.2	26.3	59.6
563	54.4	33.5	44.0	34.4	52.2	63.9	51.2	71.4	91.7	66.6	69.6	56.1	70.6	34.0	31.9	76.4
564	78.2	47.3	40.0	45.3	53.1	71.1	65.3	54.5	88.7	55.9	73.2	54.1	74.5	48.6	41.6	60.8
565	52.2	27.4	33.4	47.2	58.3	68.8	74.9	72.5	90.7	57.4	58.8	63.2	59.0	47.9	38.1	54.1
566	64.6	46.4	49.5	37.5	51.6	62.0	62.6	71.4	85.3	50.5	67.6	66.5	59.5	37.5	33.7	76.3
567	67.2	34.3	42.3	27.5	50.1	72.7	65.3	71.9	88.8	61.3	66.8	58.9	56.9	34.6	34.0	75.6
568	65.1	31.5	25.0	49.8	71.5	62.0	58.4	56.9	85.2	74.1	58.2	73.3	59.5	29.8	46.9	55.7
569	60.3	39.6	30.3	48.6	51.2	63.2	52.4	66.7	82.1	73.7	52.2	58.6	52.0	32.1	36.7	68.5
570	59.6	40.9	35.9	40.4	73.0	63.2	67.3	52.2	87.9	67.1	50.7	69.0	56.4	48.5	49.2	55.2
571	57.3	36.1	35.0	30.9	62.5	57.5	51.8	62.4	86.4	69.5	71.3	71.9	53.6	48.5	27.9	52.4
572	61.1	29.1	26.0	26.3	72.5	57.4	60.0	68.7	81.8	59.1	62.0	54.0	58.6	36.4	47.2	51.6
573	73.1	48.1	46.4	40.3	54.6	65.2	50.3	59.0	92.0	55.0	66.1	57.6	61.3	48.0	36.4	72.6
574	59.1	32.3	32.9	31.8	63.2	67.2	65.8	51.3	93.4	59.8	58.5	51.7	60.7	49.9	37.7	79.8
575	61.4	32.5	36.3	35.8	52.1	72.0	52.4	61.8	90.5	61.3	62.2	50.4	56.2	44.9	33.1	62.6
576	72.8	39.7	33.2	31.3	56.4	68.6	67.8	53.8	93.3	66.4	70.7	51.5	61.3	45.2	28.2	50.4
577	78.4	31.3	28.8	29.8	59.1	60.6	68.3	59.4	93.9	72.7	69.4	72.2	75.0	45.8	29.4	71.8
578	62.6	46.4	34.5	28.1	54.1	52.4	61.0	72.1	91.7	68.9	69.1	70.3	74.1	37.9	41.3	71.1
579	71.0	27.6	26.7	31.7	73.6	57.5	72.3	73.7	83.7	60.7	56.4	67.3	57.6	40.1	40.3	78.9
580	51.6	37.1	48.3	42.3	73.2	73.3	73.0	65.1	90.3	65.6	62.6	53.1	73.1	28.2	47.2	72.5
581	55.8	28.7	35.7	30.0	51.0	63.8	62.4	68.8	82.6	69.6	60.6	50.2	65.2	38.3	39.3	66.1
582	76.9	45.4	33.2	35.4	70.8	54.0	64.3	61.3	91.8	64.8	73.9	72.4	59.2	36.8	31.4	69.7
583	64.9	37.7	34.3	47.7	71.1	60.0	69.9	74.6	87.1	60.5	66.1	51.2	54.0	31.8	28.8	78.2
584	54.7	49.0	30.9	43.4	54.5	61.4	74.3	56.0	88.4	71.4	62.9	68.0	66.9	31.7	35.6	51.7
585	76.9	30.5	26.2	45.0	67.6	54.0	70.9	55.0	80.3	58.2	64.3	60.7	57.8	33.5	28.2	57.6
586	52.5	34.2	46.8	30.4	70.7	73.6	52.5	65.5	85.2	62.5	52.0	68.9	58.7	46.6	47.0	56.2
587	73.9	29.0	49.6	35.8	61.9	60.6	59.3	57.3	80.7	70.4	58.0	74.1	53.6	38.2	35.9	64.4
588	73.2	30.6	36.7	33.0	62.9	68.0	67.9	70.0	85.1	51.0	66.0	65.4	66.6	33.8	45.4	57.1
589	73.6	36.5	25.0	39.0	52.7	50.7	58.7	74.2	85.0	69.9	64.4	74.8	72.8	30.6	44.0	53.0
590	52.2	34.0	48.4	32.2	50.7	73.6	74.0	50.8	81.3	53.0	71.4	62.6	71.7	26.6	39.7	52.8
591	71.5	32.2	35.2	38.0	71.9	69.9	55.9	72.6	85.0	62.9	53.5	64.5	59.0	34.6	38.9	52.1
592	50.1	46.9	43.6	29.5	73.3	51.5	64.7	59.0	90.4	70.2	53.9	59.4	74.7	47.9	46.3	66.1
593	73.5	43.5	39.0	48.7	68.1	63.6	73.7	62.8	94.6	55.1	61.8	72.7	51.8	47.9	33.8	61.0
594	58.1	25.2	43.1	39.2	59.7	60.0	73.5	65.0	82.9	54.5	67.9	68.5	70.0	45.0	47.5	70.2
595	71.9	41.5	43.7	38.5	72.9	53.2	50.4	58.1	93.9	52.9	63.6	74.7	62.0	30.4	36.7	67.8
596	75.1	48.8	40.7	42.9	58.3	69.3	67.2	68.6	89.8	66.4	50.5	74.8	71.0	47.3	35.7	72.4
597	63.0	39.6	40.0	37.0	71.4	52.3	65.1	64.2	87.0	68.2	69.7	59.9	70.5	42.1	30.7	63.7
598	64.4	29.5	38.1	36.4	63.1	74.4	74.8	59.2	84.1	70.7	54.9	54.7	59.0	29.4	25.8	59.4
599	63.0	31.0	39.7	30.4	56.6	74.4	57.9	62.9	90.9	53.8	56.2	56.3	63.6	32.7	31.3	62.3
600	69.3	39.2	32.1	26.6	63.6	69.5	55.5	68.6	88.2	63.6	72.3	55.8	74.3	35.6	39.6	69.1

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
001	74.9	34.7	49.0	48.8	67.6	71.4	57.6	50.2	94.8	74.4	57.5	55.3	52.4	42.5	30.7	50.7
002	52.0	29.0	43.4	44.7	57.8	69.6	72.3	59.5	92.8	74.9	52.6	54.9	55.2	47.5	45.4	76.9
003	69.9	42.9	41.6	45.7	63.1	54.1	53.7	71.3	93.0	55.8	67.2	53.8	57.4	29.7	45.8	58.8
004	70.0	47.6	32.9	38.9	68.1	63.0	58.2	63.6	90.3	57.8	65.5	55.6	54.3	40.4	43.7	75.5
005	61.9	36.9	47.6	41.0	67.3	56.6	52.0	62.1	82.7	70.5	52.6	70.1	63.0	26.1	33.0	65.9
006	53.9	28.3	44.0	42.2	66.5	69.7	68.8	66.3	83.5	74.4	60.0	55.3	56.2	34.8	28.9	75.0
007	59.9	39.2	46.0	31.3	59.7	53.7	57.8	61.0	87.6	74.1	58.0	50.5	66.6	49.0	40.1	66.9
008	67.5	45.0	41.0	39.0	65.4	53.4	67.1	67.3	93.6	70.7	69.2	52.0	61.4	42.7	37.8	58.3
009	61.6	41.5	26.2	34.3	69.4	66.1	54.7	60.6	94.5	70.7	60.4	58.8	63.5	29.3	42.0	54.6
010	75.6	38.9	42.3	39.1	63.7	64.3	70.3	50.4	85.1	64.9	70.0	67.8	50.9	46.6	32.4	51.5
011	70.9	27.0	46.9	36.0	73.8	67.3	71.8	69.9	81.4	70.4	52.6	51.2	50.6	35.8	35.2	50.4
012	62.1	48.7	29.9	31.0	67.2	51.1	67.7	50.1	82.6	51.5	69.9	56.3	56.4	47.5	46.2	55.1
013	57.2	32.5	47.8	31.3	58.1	58.6	67.8	50.5	91.6	52.5	69.6	74.4	67.2	26.6	49.5	73.8
014	68.0	41.4	25.8	41.5	53.7	74.6	69.8	52.8	90.8	70.1	60.8	63.2	62.7	36.2	37.9	72.6
015	65.1	42.7	32.0	28.1	58.1	55.4	68.1	62.1	94.3	72.9	66.1	73.3	55.0	43.4	39.1	67.9
016	76.9	43.1	44.0	25.8	59.4	54.2	73.9	57.2	84.0	65.1	63.1	53.3	53.4	47.8	41.5	69.4
017	76.9	27.0	35.7	33.9	74.4	70.9	61.7	63.9	84.9	63.9	74.1	58.3	66.4	25.8	35.9	63.7
018	65.5	26.0	37.4	48.4	54.7	58.7	62.7	68.1	82.6	61.0	67.1	70.3	67.3	48.3	44.1	75.6
019	64.6	41.6	47.9	50.0	67.5	72.2	60.2	66.6	85.7	70.3	58.7	50.9	71.9	41.7	42.5	64.0
020	51.9	49.5	28.9	31.1	54.3	54.6	59.8	66.8	92.3	58.9	54.1	69.2	60.5	41.5	38.6	70.2
021	77.2	34.7	44.5	27.2	64.0	57.3	70.2	59.4	92.9	59.6	65.0	71.3	57.9	35.9	34.5	65.4
022	79.0	32.8	30.1	43.6	52.0	68.9	55.7	53.6	93.6	55.4	70.8	60.2	62.5	48.2	28.0	66.1
023	64.8	49.0	42.5	48.5	74.3	55.2	59.3	73.1	84.8	73.8	73.9	66.2	65.7	28.3	36.4	64.5
024	53.0	33.4	27.7	28.6	71.1	64.3	63.5	55.9	94.0	68.9	65.6	73.5	51.8	35.4	43.5	74.8
025	53.2	37.5	29.7	33.5	70.8	70.7	55.1	53.9	82.1	61.0	70.9	54.6	52.5	28.0	43.3	69.8
026	60.2	30.2	45.5	31.8	73.0	64.4	58.3	62.9	83.3	61.2	57.0	65.7	59.9	39.9	44.0	50.3
027	74.6	36.0	43.2	41.0	57.3	61.3	64.8	74.0	92.4	59.1	55.2	63.8	59.2	26.0	36.8	53.1
028	73.9	30.3	34.8	48.1	72.6	73.9	73.7	55.4	82.9	62.2	71.8	73.3	72.6	28.5	28.4	77.0
029	54.6	31.6	25.0	32.6	60.7	68.0	64.3	72.4	88.2	60.0	50.8	53.4	53.9	49.0	29.2	60.5
030	51.7	45.3	34.0	43.4	56.7	72.2	63.9	50.2	84.3	52.5	57.7	59.9	72.6	25.1	28.6	77.6
031	56.7	25.5	25.8	49.9	60.9	54.6	59.4	63.4	94.1	64.7	54.0	74.6	66.4	43.1	34.1	66.9
032	61.8	47.3	38.9	37.2	60.5	58.2	73.5	51.6	83.6	73.8	66.4	58.4	73.2	26.6	40.6	67.3
033	65.7	27.1	34.5	31.0	56.4	55.2	61.1	68.6	81.8	51.3	56.7	74.6	73.0	26.1	28.6	79.9
034	58.7	45.3	42.7	28.7	66.7	51.7	64.0	58.1	89.2	57.6	72.4	64.3	50.2	49.3	49.1	73.4
035	63.9	26.7	27.1	35.3	56.3	60.9	64.7	71.5	87.4	63.6	64.2	73.6	66.2	26.8	35.6	76.8
036	67.3	30.6	40.9	42.9	74.9	63.2	50.1	67.4	93.3	70.4	73.7	63.5	50.5	34.6	45.9	56.0
037	51.2	33.1	44.2	39.4	51.1	58.9	63.7	52.5	84.9	53.3	74.4	66.3	62.3	46.0	31.6	51.9
038	64.3	37.3	33.7	45.7	71.0	66.6	74.7	61.1	80.2	59.0	57.4	60.7	55.1	46.0	29.5	52.9
039	70.9	30.2	29.0	36.8	71.2	70.5	63.0	51.8	92.9	61.5	67.7	56.3	53.0	43.4	48.1	68.1
040	76.2	38.5	41.1	41.7	71.0	64.1	74.4	69.4	91.0	53.1	53.1	73.7	71.5	29.1	34.0	61.0
041	55.3	32.5	44.6	32.7	63.0	58.4	62.4	70.3	82.5	59.6	73.9	53.0	57.1	42.3	36.2	78.8
042	58.7	29.9	45.1	27.5	71.0	64.5	64.6	72.7	91.7	62.0	72.4	62.3	67.3	32.0	25.8	66.7
043	76.7	26.1	36.0	26.7	59.2	69.6	53.8	54.4	86.4	70.0	65.7	51.1	64.0	32.0	36.2	56.3
044	52.8	32.1	45.4	35.7	70.7	59.3	61.2	64.4	89.7	56.4	73.2	54.3	57.4	38.5	32.4	72.0
045	56.6	45.9	38.9	42.7	64.4	68.9	58.1	70.9	90.8	55.6	52.9	50.7	52.8	32.9	48.2	77.2
046	53.2	26.6	35.4	49.6	51.6	74.4	55.8	52.1	86.7	53.1	66.4	58.8	70.7	41.4	27.6	70.9
047	74.9	43.9	48.2	35.5	50.5	67.8	58.7	67.1	94.9	60.5	54.5	71.7	73.7	27.2	29.3	63.7
048	52.1	30.5	33.5	30.7	62.4	67.8	50.9	55.5	91.2	63.6	74.7	63.2	69.5	32.7	31.9	70.9
049	69.9	46.7	45.0	44.3	53.9	72.2	50.4	51.2	84.0	68.1	69.0	56.7	65.0	42.8	44.0	51.8
050	58.9	36.9	27.8	49.9	59.7	51.9	52.9	65.4	86.4	67.8	57.2	52.1	71.0	48.1	34.5	58.5
051	52.1	38.2	36.5	32.0	74.6	51.2	74.6	62.5	87.4	53.3	66.3	65.0	65.1	40.8	44.6	56.1
052	67.3	35.8	32.0	37.4	73.8	56.0	53.5	73.0	92.8	71.0	69.3	71.1	71.4	45.9	47.4	69.4
053	53.5	26.4	41.9	41.3	58.6	51.9	72.4	63.6	90.0	59.2	64.1	53.8	65.9	39.0	42.1	61.4
054	78.7	37.5	39.7	35.3	66.0	73.2	54.1	56.2	88.6	52.8	59.7	59.3	50.6	42.5	27.8	78.8
055	52.0	44.9	28.3	29.9	64.0	69.7	74.2	53.3	84.6	72.7	73.9	59.0	61.8	30.5	31.5	77.8
056	59.5	48.3	33.6	49.6	50.4	64.7	53.5	68.4	90.7	52.3	67.5	69.2	61.7	28.9	25.6	50.4
057	61.4	32.9	45.8	28.3	65.8	72.5	72.1	50.3	85.1	72.0	57.0	70.9	53.6	28.1	39.8	64.5
058	53.2	43.6	48.2	41.9	67.3	57.0	73.7	52.4	85.1	72.8	53.6	52.3	61.4	27.1	37.2	73.4
059	52.5	25.9	30.5	31.6	68.3	73.6	62.7	62.8	82.1	62.2	71.0	70.3	69.9	37.4	28.3	66.7
060	61.7	48.0	34.5	46.0	60.8	51.7	73.8	73.9	83.2	66.5	54.0	51.1	69.7	39.1	35.9	53.4
061	50.1	27.1	49.3	40.2	59.7	51.5	63.8	55.4	91.8	71.7	71.0	56.5	71.0	33.4	39.2	75.2
062	54.3	33.7	32.5	27.9	55.8	50.6	66.6	55.3	94.4	51.4	50.1	58.3	66.8	39.2	44.5	70.5
063	63.0	33.7	35.5	36.3	53.8	72.8	66.8	55.0	84.7	66.7	74.0	64.7	64.8	32.8	45.8	51.7
064	74.2	43.5	35.5	29.7	61.6	74.9	53.5	50.4	91.5	74.3	60.8	70.3	69.0	37.2	32.8	60.9
065	51.6	46.7	40.2	34.0	56.6	64.2	64.9	74.3	93.5	55.5	70.0	53.2	52.6	25.6	49.6	64.6
066	61.1	43.8	31.1	48.8	72.4	60.7	55.3	66.3	86.1	61.8	73.0	69.6	69.9	42.9	42.0	56.8
067	67.5	36.4	33.9	46.7	62.9	57.6	65.5	60.8	89.5	57.0	64.7	60.7	58.3	42.1	27.6	54.6
068	62.2	27.6	38.9	41.6	67.4	57.4	68.8	58.7	94.0	73.7	53.8	50.4	74.0	42.3	47.8	69.1
069	56.2	25.1	28.1	39.0	53.5	52.5	63.2	56.6	94.2	67.4	63.5	59.0	59.6	48.0	38.2	77.8
070	78.6	26.6	30.7	49.4	65.8	66.2	72.5	68.1	85.1	73.9	65.9	58.7	56.4	35.9	37.9	61.6
071	69.7	29.4	34.6	48.3	68.4	73.4	70.9	58.4	87.3	68.2	72.5	61.8	61.6	47.2	35.7	58.9
072	54.9	43.7	34.0	26.7	70.8	63.7	53.0	70.7	85.2	56.0	68.0	60.2	64.3	37.9	36.1	76.8
073	61.6	29.6	49.2	31.6	54.2	52.9	59.7	72.9	83.5	69.1	68.3	52.5	68.9	45.9	35.6	51.9
074	56.3	49.4	44.4	49.5	56.0	69.6	72.2	50.8	81.2	67.8	54.3	55.6	51.8	42.3	45.9	54.4
075	72.3	27.8	42.4	27.1	60.7	63.6	52.4	66.0	84.1	54.1	62.2	33.6	68.0	41.7	29.8	62.2

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
676	69.8	41.9	36.9	27.5	58.8	70.2	65.6	70.6	94.5	56.6	58.1	52.1	66.2	34.7	48.4	50.1
677	66.9	26.8	32.8	42.9	62.5	59.9	69.8	67.2	85.6	50.6	54.8	65.8	56.8	45.0	30.9	73.7
678	51.6	45.0	48.2	43.0	71.8	54.0	74.0	71.1	94.1	58.5	54.8	62.8	51.4	26.0	37.2	58.8
679	75.5	33.2	26.9	44.8	57.0	50.7	50.8	57.4	82.4	62.7	65.5	65.3	69.5	34.7	35.7	76.9
680	74.7	46.1	45.1	33.2	56.8	70.3	68.7	53.5	92.1	69.1	67.1	61.2	55.3	47.2	31.5	75.1
681	72.9	37.8	27.0	36.4	57.8	51.7	56.4	52.6	86.3	61.8	52.5	68.0	61.7	46.2	27.5	53.4
682	54.4	45.5	35.9	42.5	69.3	50.5	52.1	63.6	87.4	65.7	63.1	50.3	51.6	36.2	25.2	66.7
683	76.1	36.6	32.9	25.5	56.8	61.5	56.9	66.5	92.7	55.0	66.5	51.1	53.8	32.0	48.0	62.4
684	52.7	38.2	48.2	34.5	51.0	60.2	51.7	62.8	93.2	63.9	52.2	61.5	56.5	34.4	43.4	78.4
685	58.5	37.9	46.1	25.5	58.4	69.4	62.6	57.2	80.5	64.4	55.5	65.7	58.5	41.7	47.7	51.1
686	54.8	47.3	36.9	29.6	73.2	61.4	64.6	74.3	80.8	60.9	56.9	62.4	55.1	40.7	37.5	64.5
687	64.2	26.6	49.0	26.0	69.7	64.7	51.7	51.1	91.2	52.6	66.1	56.7	69.4	29.0	28.5	71.7
688	58.1	35.4	44.4	37.7	65.5	55.4	71.8	50.4	89.2	62.9	61.4	68.3	62.9	37.0	32.3	74.4
689	66.7	26.4	25.7	35.0	54.9	69.1	65.6	65.0	84.7	56.2	56.9	53.4	69.7	36.3	25.8	79.0
690	57.9	42.0	33.1	45.4	62.1	67.1	52.2	57.9	86.2	57.3	68.9	53.4	67.4	49.7	42.7	58.3
691	78.7	42.2	46.4	40.2	63.7	73.6	58.6	60.3	88.0	52.2	58.4	69.1	63.2	35.1	33.0	64.5
692	55.7	32.4	46.1	36.2	57.2	51.4	67.8	68.1	94.9	56.3	68.7	57.8	53.6	46.0	43.5	58.4
693	66.9	48.0	28.1	38.4	73.7	53.4	71.7	69.2	86.4	52.3	52.6	58.7	52.8	47.2	45.6	68.3
694	65.5	44.5	36.7	44.7	53.8	71.6	56.9	62.6	82.0	58.3	59.2	54.6	65.9	33.6	42.9	76.8
695	68.7	37.9	36.9	41.8	53.8	67.0	52.6	57.0	87.7	69.6	61.3	51.7	56.5	47.9	40.9	65.6
696	70.2	35.5	47.0	41.4	58.7	67.1	60.0	55.8	92.2	60.0	52.0	57.5	62.8	27.9	38.7	55.0
697	74.7	28.6	49.0	48.5	68.0	62.7	74.2	70.6	90.6	64.0	67.1	61.6	53.0	45.0	37.3	73.8
698	65.6	32.1	48.6	29.5	69.0	72.7	73.2	67.9	88.9	52.6	67.7	64.8	52.5	38.3	27.3	74.4
699	57.6	33.2	40.3	32.0	57.2	65.7	56.5	73.0	83.5	55.3	50.8	54.5	52.3	37.1	44.7	65.3
700	66.9	35.5	28.2	46.3	65.7	57.2	61.1	53.8	91.2	67.2	50.7	62.2	56.9	41.9	43.0	67.2
701	72.5	45.5	41.3	25.2	74.8	55.5	53.9	65.2	90.8	53.8	54.7	55.5	54.8	37.7	36.8	63.6
702	50.7	29.4	40.6	42.2	57.3	71.2	73.9	63.5	86.6	51.9	61.3	52.2	62.0	41.6	39.7	76.7
703	50.2	39.0	36.4	44.2	61.3	52.9	50.4	55.3	84.3	61.3	63.1	64.4	63.0	36.4	29.6	56.1
704	77.4	44.9	41.5	33.7	68.6	71.6	58.9	65.4	94.9	63.0	59.8	54.7	53.9	49.8	48.9	54.1
705	58.4	39.4	28.5	25.6	51.2	68.6	52.4	69.6	81.8	60.5	65.8	66.8	59.6	43.0	47.9	60.5
706	53.4	39.6	45.0	35.3	73.8	72.1	71.2	64.5	84.1	68.1	69.8	57.4	63.9	47.4	38.3	79.0
707	74.7	25.4	40.5	35.7	58.3	63.6	56.6	57.5	82.0	61.9	66.0	66.3	60.3	28.3	27.9	67.4
708	53.3	48.8	26.2	33.9	72.6	68.0	59.6	72.1	85.5	50.6	69.3	63.4	63.4	47.5	34.2	53.3
709	77.2	41.3	41.9	35.1	66.5	69.4	52.5	56.7	89.7	53.7	63.5	64.1	60.5	26.9	49.8	53.8
710	79.6	32.5	41.2	42.4	65.0	65.2	71.9	67.3	90.3	57.9	65.7	58.4	57.7	31.7	44.7	57.6
711	63.0	27.5	39.6	42.9	58.3	51.4	52.2	60.6	80.3	54.2	53.4	55.6	58.2	31.4	35.7	59.3
712	52.9	37.1	37.8	49.0	65.4	67.9	72.0	64.0	94.1	50.5	53.7	67.9	64.5	33.3	45.6	63.9
713	62.0	37.1	29.1	29.4	57.3	55.2	65.0	71.1	86.3	50.5	53.4	51.5	57.3	38.8	49.8	78.6
714	59.6	36.2	44.3	26.2	68.8	67.3	66.1	64.8	91.6	53.3	67.9	57.6	60.0	47.1	42.5	59.8
715	74.0	26.2	44.3	39.4	58.9	66.3	68.9	52.2	94.5	67.7	61.5	59.6	64.0	38.3	40.0	58.4
716	70.7	25.4	30.1	45.8	64.5	57.6	63.3	68.1	88.8	57.4	67.5	62.8	63.9	46.3	41.6	67.8
717	66.8	26.1	47.8	36.9	65.5	69.3	65.4	64.6	87.9	67.5	54.3	50.9	64.6	32.6	36.7	74.7
718	55.6	27.5	32.2	31.7	59.0	66.0	65.1	68.5	85.3	57.2	57.4	53.6	61.6	41.6	31.8	57.0
719	60.8	48.2	40.7	41.5	58.8	67.6	56.2	64.3	93.9	65.4	55.5	56.3	66.4	28.0	46.2	77.8
720	70.8	32.1	28.9	25.8	50.5	66.0	51.7	51.4	94.9	69.3	66.8	65.3	53.0	35.5	48.2	57.4
721	62.5	25.4	42.1	37.1	50.1	63.8	60.9	61.8	91.1	70.0	64.1	56.9	69.8	27.3	32.5	67.7
722	53.0	44.9	34.9	27.8	50.4	61.5	67.2	58.8	87.2	52.7	53.1	52.9	65.1	39.5	39.1	52.3
723	63.0	28.3	28.0	27.5	66.2	55.1	52.0	64.4	92.6	67.0	52.2	53.6	68.0	43.4	45.6	73.5
724	56.2	27.5	29.1	29.7	55.6	57.9	58.0	61.2	91.0	55.4	57.8	64.4	50.2	31.7	37.8	76.6
725	54.6	28.0	46.1	44.3	61.5	55.2	50.5	57.1	81.0	68.1	57.5	50.4	66.8	41.4	38.9	79.9
726	65.5	36.5	27.2	30.7	59.2	62.7	60.5	50.1	94.0	69.3	58.0	52.5	59.0	36.2	33.1	59.3
727	55.8	34.5	39.4	32.2	57.3	54.2	51.8	59.6	91.0	50.6	54.9	54.1	63.4	46.3	48.5	74.8
728	73.4	42.4	37.4	37.8	63.0	56.0	50.5	67.3	81.5	54.3	55.3	55.7	55.0	36.1	48.6	72.2
729	54.2	27.8	36.5	48.0	50.2	60.4	68.6	57.1	90.3	69.6	59.9	68.5	52.8	46.0	28.7	51.1
730	77.1	49.4	47.6	35.5	67.1	68.2	61.2	62.1	94.4	52.7	64.7	60.2	56.5	25.1	33.8	55.6
731	51.2	31.0	25.4	29.7	63.3	67.7	60.7	52.7	90.7	67.7	64.6	65.7	52.1	34.9	32.9	51.8
732	50.3	30.9	32.4	47.3	67.4	54.4	58.8	58.5	84.5	52.6	66.2	63.4	56.0	39.3	28.2	78.0
733	58.2	39.6	41.6	27.2	59.8	50.2	60.0	52.3	80.5	65.4	65.8	59.6	61.2	30.2	36.8	71.0
734	67.7	28.0	41.7	38.1	55.1	51.2	55.6	63.0	92.0	68.1	52.0	51.6	66.5	31.5	34.2	78.3
735	77.9	29.2	47.9	35.3	60.3	66.3	56.3	57.0	86.7	56.0	64.1	64.5	68.8	32.6	45.0	71.3
736	65.6	31.6	33.0	46.0	60.5	65.9	63.0	51.6	84.6	54.3	52.8	57.9	63.1	40.3	29.6	50.7
737	54.2	31.6	33.1	38.5	53.0	61.1	51.1	57.3	89.4	59.2	61.3	50.4	68.6	27.4	45.0	62.4
738	79.7	43.8	47.2	38.5	62.0	61.9	62.3	54.7	80.7	63.4	58.2	57.7	54.1	44.7	44.2	79.5
739	51.6	46.1	49.6	35.2	59.4	64.4	60.1	55.9	91.1	51.4	53.9	53.2	51.5	25.5	41.0	69.6
740	58.1	25.1	47.9	30.0	52.7	63.1	62.7	57.5	89.8	66.2	58.3	58.9	60.1	35.4	45.1	74.0
741	59.3	46.5	33.5	42.9	57.5	67.0	62.5	60.8	93.3	68.9	59.1	60.2	59.4	27.6	40.2	63.0
742	60.3	35.6	27.3	48.3	69.6	60.6	58.8	64.4	86.6	69.3	56.8	52.3	54.0	32.8	46.7	56.1
743	55.2	45.3	49.1	46.9	63.8	67.0	68.5	61.5	93.7	50.5	57.8	63.2	56.9	35.3	30.8	76.0
744	74.0	41.0	35.0	37.0	52.3	57.3	64.8	54.6	92.8	54.0	57.5	57.5	55.7	29.1	35.9	50.1
745	70.1	28.5	41.1	28.2	56.5	68.2	55.9	59.7	82.0	60.2	50.5	52.0	65.8	35.7	40.6	51.8
746	65.3	25.0	46.7	38.0	54.7	63.2	57.8	63.1	91.8	52.6	50.2	54.9	56.2	46.9	45.7	56.9
747	74.0	32.8	49.3	42.5	55.5	67.8	64.5	62.9	84.6	55.2	55.2	50.5	53.4	34.5	48.4	55.1
748	77.3	45.5	41.0	38.3	68.7	53.6	58.4	53.2	84.9	69.6	50.1	69.8	51.8	36.0	46.1	59.0
749	58.6	39.7	45.7	48.3	52.2	55.3	58.9	60.4	85.5	55.3	50.9	70.0	68.1	49.4	37.7	74.2
750	53.5	32.9	36.8	49.9	63.8	55.3	54.9	64.8	84.8	60.5	60.9	66.7	66.2	26.0	40.7	51.5

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
751	50.8	49.7	25.6	44.2	64.4	65.0	60.5	58.2	92.1	54.3	67.4	51.0	66.4	38.9	34.2	51.9
752	58.5	43.8	28.5	39.4	53.8	64.7	68.6	60.2	93.5	53.1	55.9	66.9	68.3	44.1	41.6	73.4
753	79.5	45.5	45.7	31.3	54.2	57.7	51.0	67.9	89.4	62.1	55.0	67.0	53.6	38.4	40.0	65.5
754	66.2	41.0	26.8	37.2	62.8	69.4	69.9	51.3	88.8	54.2	58.6	62.0	54.7	47.4	41.5	68.5
755	51.9	44.0	38.9	37.5	51.6	60.3	51.6	58.6	94.8	67.7	60.6	50.3	50.7	36.5	36.7	64.6
756	54.0	26.0	26.5	34.7	59.8	67.4	59.4	66.7	90.7	64.1	53.1	68.4	68.7	47.2	30.6	60.0
757	54.3	45.9	47.0	41.2	64.2	54.6	68.1	52.0	92.5	55.5	53.8	55.2	69.9	44.4	36.9	55.6
758	79.1	37.5	35.0	30.5	68.8	68.7	59.2	68.9	84.7	62.3	63.6	60.3	60.5	28.4	44.0	59.4
759	78.5	35.8	39.1	44.6	64.0	69.7	59.8	57.3	85.5	66.6	63.4	59.0	66.1	32.3	31.3	70.7
760	74.1	45.2	27.7	45.6	54.6	56.9	51.2	51.1	93.7	66.6	59.7	51.0	50.3	35.8	28.3	51.0
761	61.5	37.7	39.3	26.4	63.6	51.3	61.2	69.0	81.6	52.7	50.1	58.0	59.5	49.9	25.8	62.0
762	62.2	42.6	44.5	46.6	66.7	56.7	69.7	51.9	94.6	56.9	54.0	60.9	61.1	44.0	32.7	75.2
763	72.8	46.7	26.7	45.8	55.3	68.1	55.3	50.8	80.7	50.7	57.8	62.1	60.3	38.1	30.9	58.0
764	67.3	40.1	43.6	37.7	62.0	68.9	55.6	60.8	80.9	63.6	61.9	68.7	63.8	32.1	29.4	65.1
765	78.1	33.0	26.2	29.6	63.6	67.2	61.1	51.5	92.0	64.3	61.3	56.1	53.3	35.4	34.2	71.2
766	76.7	49.8	45.7	27.5	65.3	66.8	52.5	51.6	84.7	55.5	55.4	64.3	54.7	29.5	40.7	70.9
767	61.2	47.7	42.5	43.7	55.0	64.3	57.7	67.9	88.7	69.7	58.2	69.8	66.0	46.9	30.8	52.8
768	50.9	46.6	31.3	41.3	53.4	66.9	58.6	55.3	87.2	66.1	51.5	50.8	68.0	41.7	38.3	78.7
769	64.4	47.1	46.9	45.6	62.0	69.3	60.3	63.7	83.5	58.1	54.1	58.0	64.4	42.6	35.8	52.0
770	62.4	49.9	31.8	45.3	60.5	67.5	66.8	63.5	93.3	66.6	56.8	52.1	52.3	40.4	36.2	74.6
771	79.1	31.9	33.6	34.2	61.2	65.6	50.4	68.2	87.6	59.9	69.3	52.3	65.7	28.0	43.4	74.2
772	69.7	43.5	40.5	46.1	67.2	63.0	68.7	52.9	89.6	63.7	56.1	57.2	63.9	31.0	35.8	79.4
773	59.1	29.7	36.7	37.2	59.8	60.8	60.2	57.9	92.5	59.7	52.1	51.1	59.8	29.3	35.7	56.9
774	73.1	34.4	47.6	26.9	61.0	63.0	56.2	59.7	80.4	55.1	66.2	65.3	56.0	32.6	47.8	55.4
775	69.4	25.7	47.3	25.5	62.4	58.5	67.3	52.8	91.8	63.2	69.9	67.0	51.0	35.7	34.3	75.0
776	60.6	43.5	39.8	40.8	50.6	56.5	51.6	50.3	87.7	65.6	53.0	67.4	50.6	44.4	45.7	66.7
777	52.0	32.3	26.8	32.6	62.2	55.8	53.1	65.0	82.3	60.2	66.6	61.3	68.6	49.6	25.7	55.6
778	75.8	31.2	42.1	46.5	54.1	67.4	59.4	65.8	86.1	54.2	53.3	61.5	52.2	45.5	36.7	50.5
779	52.6	47.3	31.9	27.1	70.0	69.0	54.3	64.4	88.0	62.4	52.2	61.0	56.0	39.5	26.7	71.1
780	55.2	44.8	26.6	37.1	68.9	68.6	58.3	64.6	83.6	54.0	61.6	67.1	58.8	44.9	29.2	53.0
781	52.9	43.2	45.1	30.2	52.0	50.1	64.8	57.7	82.1	66.5	69.8	54.9	61.8	33.8	35.6	64.2
782	72.7	27.4	34.7	43.0	60.5	54.7	63.3	66.1	88.2	51.2	55.5	57.7	66.7	29.1	32.5	66.4
783	59.6	37.5	49.9	41.5	51.4	63.9	67.9	62.9	88.9	62.3	52.6	60.5	58.7	38.5	42.7	71.0
784	79.9	25.7	46.7	33.5	60.4	54.4	57.8	57.7	80.1	61.0	53.7	62.5	51.5	45.8	33.0	69.9
785	58.4	42.5	40.9	42.3	55.9	61.4	63.4	53.7	85.8	63.9	55.0	67.5	65.4	41.4	32.4	56.3
786	52.6	30.0	26.4	34.9	66.4	66.4	59.4	63.6	88.6	53.1	63.7	57.8	67.9	38.0	25.0	54.4
787	52.6	42.6	35.4	49.0	64.1	63.3	66.0	55.8	86.0	68.7	66.7	60.5	63.2	40.9	38.6	70.6
788	63.3	30.5	37.2	44.0	55.7	51.6	66.1	52.1	87.5	68.1	68.4	55.3	69.9	47.2	35.8	55.5
789	54.5	25.0	46.6	41.6	50.8	57.2	59.6	57.6	84.1	59.5	58.2	62.5	65.1	37.5	40.6	66.4
790	63.9	32.2	35.8	40.3	65.8	55.2	66.0	61.5	89.2	53.8	50.7	66.0	61.3	42.5	28.2	72.4
791	66.3	28.0	47.6	49.5	62.8	60.7	57.2	61.7	90.0	58.7	58.0	63.3	68.5	25.7	48.6	62.2
792	51.5	48.8	36.3	31.9	54.9	57.3	65.5	61.0	82.3	58.7	54.9	51.9	58.6	28.6	40.0	76.0
793	75.0	49.6	26.4	44.7	57.2	60.9	59.5	59.0	81.8	51.1	52.0	51.1	65.2	27.4	47.8	56.3
794	74.2	33.0	40.1	34.6	69.7	61.2	69.9	59.4	86.4	56.2	64.0	65.2	59.5	30.5	26.4	56.9
795	70.2	29.7	29.6	31.9	60.1	64.2	50.6	66.8	88.2	65.4	55.0	67.7	61.3	32.7	27.3	53.9
796	79.8	41.8	36.6	46.6	68.6	55.4	57.8	64.2	87.0	68.9	61.6	53.1	62.0	36.7	36.4	70.6
797	63.6	27.1	32.6	39.7	64.4	67.8	68.8	52.9	83.6	66.1	55.5	59.1	64.4	34.6	25.8	52.4
798	73.3	42.8	36.5	26.0	68.8	66.0	59.5	50.8	87.9	61.7	64.9	62.5	59.2	40.2	34.3	52.4
799	62.5	36.3	41.1	40.6	60.2	63.4	59.5	63.0	88.0	53.2	58.0	61.6	64.6	26.5	34.6	60.1
800	75.1	33.6	25.2	49.9	66.7	64.5	58.4	65.2	80.2	61.6	67.3	67.1	58.1	41.7	31.0	69.8
801	69.6	35.5	45.1	47.3	62.1	65.5	69.5	63.3	85.0	64.2	62.3	54.7	68.2	43.2	49.2	72.6
802	67.0	25.9	34.4	46.3	64.1	60.9	67.7	51.2	87.0	57.3	65.4	66.6	69.6	36.1	46.0	60.0
803	66.2	49.1	32.4	30.6	62.0	52.9	68.4	52.1	85.0	59.2	57.6	52.1	66.3	45.9	31.7	68.2
804	67.3	26.6	40.3	43.4	61.9	62.9	67.2	65.3	85.3	59.2	57.6	50.2	69.9	42.6	44.4	68.3
805	56.8	25.3	36.6	33.4	62.8	53.8	53.7	53.3	81.3	62.8	63.2	63.7	52.1	34.5	49.5	71.0
806	50.5	34.0	45.0	30.5	58.8	52.7	57.3	55.8	85.8	51.5	61.1	58.0	64.5	25.3	39.3	78.9
807	57.0	36.5	38.2	26.5	53.5	56.1	52.5	58.1	80.2	64.6	63.4	65.3	56.8	26.0	25.1	68.2
808	53.2	41.5	37.8	45.9	60.2	58.3	53.7	59.4	89.5	52.8	54.6	55.9	61.4	38.9	48.4	80.0
809	70.5	38.4	47.9	25.1	51.6	50.7	64.2	52.0	85.9	60.4	59.7	60.4	63.3	42.2	41.3	73.5
810	57.2	39.2	34.6	30.7	50.6	53.0	63.0	54.8	88.1	52.7	62.1	52.0	55.3	46.8	29.1	69.3
811	58.1	33.8	39.6	45.4	56.3	59.9	62.9	53.3	80.3	50.4	65.6	68.6	57.2	38.9	44.3	57.8
812	59.4	35.9	41.9	30.1	61.2	54.0	63.6	59.9	84.0	68.3	50.2	61.7	66.6	48.6	42.3	54.1
813	62.6	33.2	35.1	38.8	53.9	53.7	51.6	50.2	87.4	63.5	62.3	57.2	61.9	45.7	27.8	52.4
814	66.7	45.1	44.5	42.8	55.0	58.6	58.6	51.9	84.7	59.7	53.9	56.3	51.4	47.5	42.8	61.3
815	59.5	46.7	34.8	33.7	51.7	59.8	50.6	51.8	80.9	53.7	56.5	60.2	58.4	44.0	28.2	57.3
816	62.3	30.9	43.7	47.6	57.3	59.0	56.5	64.6	84.1	50.9	54.0	55.4	61.8	38.3	31.5	53.5
817	74.1	46.7	39.6	30.2	54.6	55.9	51.0	60.7	82.7	55.5	60.4	62.9	61.6	31.6	40.5	59.0
818	64.9	48.1	44.7	45.8	61.1	60.1	51.7	55.5	87.9	63.5	56.7	59.1	51.8	28.1	27.9	60.8
819	79.3	43.8	33.0	46.2	54.0	62.5	59.9	56.9	81.2	59.6	51.3	61.8	52.0	31.3	37.0	58.2
820	57.9	40.3	49.0	29.6	60.7	54.3	64.4	51.9	87.6	59.9	59.6	62.4	63.3	29.6	28.9	57.3
821	53.0	47.9	44.7	42.8	64.2	55.7	55.8	63.9	83.0	62.2	63.2	57.8	58.4	39.9	29.9	64.2
822	62.6	44.3	28.6	48.8	50.4	56.7	53.3	61.9	89.0	53.3	60.6	53.0	62.9	43.8	27.8	64.8
823	54.9	28.6	47.5	26.1	64.2	52.5	56.7	50.1	88.2	60.4	55.0	54.5	64.5	26.9	37.9	50.6
824	64.9	39.9	32.8	49.3	64.8	58.8	52.7	63.1	80.5	55.0	58.8	60.0	63.7	46.9	43.7	59.8
825	58.8	32.3	46.3	28.6	53.4	58.3	52.1	57.4	80.8	58.9	56.9	51.2	62.4	46.9	46.8	65.1

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
826	58.4	34.4	25.2	38.4	59.4	54.1	56.2	51.6	86.8	58.1	64.9	50.4	62.6	41.0	25.9	58.2
827	54.9	40.4	47.0	36.4	59.2	54.3	50.4	63.8	89.6	58.4	58.3	53.9	54.3	44.7	30.6	72.9
828	65.5	47.4	48.1	47.5	61.7	57.5	62.9	62.8	89.8	58.6	55.0	57.5	51.3	47.4	30.2	59.9
829	58.0	35.7	32.0	49.1	56.0	58.0	60.4	57.1	87.1	57.3	52.9	56.4	56.0	49.1	29.8	77.6
830	55.8	47.8	32.6	41.4	51.9	54.8	57.9	60.6	86.3	58.8	56.0	57.6	61.9	25.9	41.4	62.4
831	61.0	43.0	26.2	39.6	61.7	64.1	56.7	58.7	89.2	59.4	54.7	58.7	50.1	25.8	44.8	80.0
832	75.7	45.4	26.4	46.1	60.0	57.9	55.6	62.4	81.2	61.4	60.8	59.7	52.6	42.7	48.9	71.9
833	72.1	39.0	48.5	34.3	52.3	60.7	56.5	57.1	83.4	61.6	54.8	58.2	64.4	32.4	27.8	68.2
834	51.3	37.2	32.2	45.7	58.4	55.3	63.8	55.6	82.6	53.0	64.7	60.4	56.5	25.4	25.4	50.2
835	75.6	46.3	34.8	48.6	61.3	53.0	56.8	63.1	84.9	58.8	64.2	64.5	56.3	30.9	29.4	52.0
836	70.5	34.9	47.1	40.6	58.2	54.3	53.9	62.0	85.6	60.3	57.5	58.4	61.8	39.4	38.7	77.2
837	75.0	47.2	31.9	39.2	63.9	59.4	57.4	52.5	80.4	55.6	58.9	62.1	54.5	38.0	48.1	72.2
838	65.0	31.0	48.5	25.9	51.2	51.9	53.5	61.8	84.9	59.2	51.1	50.8	63.9	36.4	31.4	52.1
839	70.3	42.7	47.2	29.1	61.9	58.1	53.1	56.0	83.3	64.2	64.4	55.3	56.5	40.9	48.8	65.1
840	61.0	40.5	44.6	40.8	59.5	51.6	63.6	56.3	89.4	59.0	59.5	64.8	55.7	36.3	33.5	76.6
841	68.2	44.1	41.2	38.9	54.4	56.1	59.5	54.8	82.6	52.0	56.7	62.6	52.9	44.3	48.9	71.8
842	53.0	38.2	30.4	37.9	59.0	55.1	52.5	53.2	86.3	58.6	57.9	58.0	57.4	29.1	31.7	51.5
843	63.8	27.8	26.4	36.7	63.4	55.9	54.9	59.3	81.6	53.7	64.5	64.1	52.6	27.0	31.6	56.5
844	62.8	42.3	43.7	45.9	56.2	59.3	53.2	52.0	85.9	57.5	52.3	50.0	58.7	44.7	26.5	66.9
845	56.5	34.2	38.8	40.4	51.4	58.1	55.4	59.9	82.1	55.7	50.5	54.0	53.6	48.3	26.7	78.9
846	68.7	38.1	45.4	46.2	61.8	62.1	63.2	58.6	81.6	57.5	61.5	52.5	61.0	36.6	49.3	57.5
847	70.4	44.7	40.1	33.7	53.8	55.6	62.2	52.3	88.3	58.8	62.4	57.9	58.4	49.3	48.3	61.7
848	69.7	49.6	39.1	33.4	61.4	59.4	61.0	50.9	84.8	55.8	60.2	57.0	58.5	31.0	49.7	74.0
849	52.0	36.6	27.1	34.8	53.7	58.1	56.4	55.0	85.5	58.5	64.4	61.6	59.1	41.8	31.8	53.8
850	77.3	25.4	42.3	25.5	64.5	58.7	60.1	60.0	82.3	53.9	62.7	51.3	57.4	25.3	33.8	68.5
851	74.8	27.7	44.4	27.0	62.4	58.7	50.9	50.6	89.4	63.6	58.6	54.9	53.8	42.6	47.0	51.1
852	72.1	45.7	30.4	36.7	56.3	53.8	55.2	59.2	86.9	57.5	63.2	57.4	58.1	31.7	28.5	79.3
853	75.0	28.0	46.7	36.3	53.4	51.4	64.0	62.7	81.7	54.1	63.7	54.8	52.6	47.6	36.2	73.4
854	64.4	25.8	46.3	27.8	60.9	57.6	64.4	51.5	85.2	61.0	59.2	55.7	52.7	31.0	26.0	51.7
855	76.1	47.7	48.0	48.4	55.3	51.8	56.3	62.4	87.7	53.1	54.6	54.3	51.1	27.5	31.2	63.1
856	55.5	50.0	28.1	45.4	62.8	52.8	62.0	56.5	81.3	50.3	60.4	60.3	51.1	27.7	40.0	66.6
857	53.8	38.1	46.1	27.8	60.5	53.8	54.7	54.9	80.4	55.3	64.8	53.9	57.1	42.9	27.2	77.4
858	75.7	26.8	43.7	48.6	53.9	57.1	58.9	57.0	87.8	63.4	58.9	52.5	57.4	28.5	44.9	79.3
859	76.7	29.1	42.5	34.0	64.5	56.1	63.6	57.0	83.4	61.4	52.7	57.8	60.8	38.3	39.0	54.2
860	50.9	41.8	39.1	29.8	50.6	54.7	53.8	61.8	89.6	57.4	61.5	57.0	54.5	44.6	33.9	68.3
861	72.1	31.2	38.7	28.3	58.8	59.6	52.6	53.7	88.4	61.1	53.7	50.6	60.7	41.8	44.6	52.8
862	78.2	32.7	36.1	36.6	56.0	59.7	59.0	58.5	87.5	63.1	54.8	50.9	61.5	39.7	36.3	69.9
863	66.3	31.3	37.7	33.1	60.4	51.2	56.7	53.2	83.7	52.5	50.1	58.3	58.6	46.6	27.8	58.8
864	53.5	26.2	27.9	47.0	59.8	60.3	52.6	64.9	83.8	63.2	64.3	63.2	58.7	26.8	28.0	73.4
865	51.1	30.2	30.7	29.0	50.2	61.6	51.4	60.7	81.1	54.4	54.0	55.8	58.7	31.3	35.3	61.7
866	58.0	46.9	48.6	36.1	50.2	63.4	58.7	52.1	89.1	51.6	64.6	58.1	55.3	36.8	34.9	79.7
867	74.9	32.5	48.3	28.3	52.5	59.8	59.5	55.6	88.2	58.6	57.3	62.2	51.4	49.7	30.2	63.6
868	66.9	37.1	48.2	41.6	61.1	54.9	52.3	54.1	88.1	52.4	58.1	59.5	63.3	41.8	33.1	71.4
869	50.6	43.9	45.3	36.2	52.3	62.6	60.3	58.9	85.9	51.1	53.2	57.9	63.1	27.6	47.9	56.8
870	57.8	37.5	46.8	37.5	64.1	54.1	52.9	55.6	88.1	63.9	51.7	55.7	64.2	33.9	29.0	71.3
871	58.1	48.3	35.9	47.9	54.0	63.8	61.7	63.1	86.1	64.1	64.1	64.1	54.9	48.2	34.3	55.1
872	64.8	43.1	27.4	37.7	62.0	55.4	63.1	63.8	80.9	63.9	58.9	57.6	53.5	32.1	30.0	50.8
873	50.2	27.6	39.0	29.7	59.8	62.6	64.1	58.3	82.9	64.8	56.4	60.5	61.6	46.6	36.8	59.0
874	72.2	46.0	25.6	48.3	62.4	59.0	61.2	51.4	81.4	53.9	64.8	58.1	51.5	45.4	45.1	75.0
875	66.8	33.0	47.9	42.8	62.8	60.0	51.0	58.0	81.9	57.3	57.1	50.8	52.2	31.8	35.8	67.4
876	60.7	41.9	37.9	42.8	63.7	63.9	52.3	61.2	83.5	57.3	57.2	58.3	50.3	29.7	34.6	57.3
877	56.7	25.3	32.5	40.0	50.6	50.1	56.0	63.8	86.1	57.5	58.5	54.3	59.7	38.1	33.3	65.7
878	79.0	27.9	33.5	31.2	60.8	50.2	63.2	64.9	82.7	64.5	57.8	63.2	52.7	39.1	32.0	75.2
879	66.1	26.5	47.6	37.3	52.9	58.1	56.7	59.1	83.7	54.6	55.3	54.3	51.6	39.6	36.2	61.6
880	50.3	32.2	43.2	36.6	53.0	64.9	54.7	50.8	85.0	59.4	54.4	55.3	57.9	43.4	26.2	61.5
881	52.7	29.4	46.6	46.6	63.2	58.9	62.6	51.8	80.7	53.8	59.8	59.9	53.5	27.3	43.2	72.9
882	54.8	25.8	46.7	43.3	52.9	50.7	55.3	56.2	86.3	56.4	63.9	53.9	59.3	25.5	38.1	68.8
883	56.0	46.3	43.3	34.0	52.7	53.9	58.1	50.8	80.3	59.0	50.0	50.9	61.2	48.7	39.0	63.2
884	63.9	26.0	41.5	42.7	62.8	60.6	62.4	56.2	83.0	58.7	63.2	57.3	61.5	32.4	34.7	66.6
885	76.1	39.8	27.4	46.6	52.6	51.8	52.2	60.5	86.8	63.0	60.2	50.8	62.2	30.2	42.7	73.1
886	60.3	28.9	27.8	33.6	54.9	54.0	55.9	59.8	86.6	56.1	50.0	60.8	64.4	43.9	36.7	66.4
887	74.2	43.0	25.9	40.1	53.4	58.8	57.2	51.2	83.7	60.0	64.4	64.1	58.6	35.8	45.3	53.3
888	64.1	40.0	38.4	29.2	61.5	63.3	51.4	63.4	84.2	56.1	51.9	52.9	50.8	40.8	37.7	75.4
889	68.6	28.1	33.1	43.3	64.0	53.9	61.7	56.5	85.1	60.3	64.9	52.5	63.7	43.3	46.0	52.4
890	72.6	32.1	26.8	40.9	52.5	51.7	53.9	59.8	80.6	60.4	63.9	55.5	60.6	44.2	39.6	54.3
891	70.4	29.3	38.5	40.3	50.1	54.8	52.2	55.1	85.1	60.5	64.4	61.5	50.7	28.6	42.3	69.3
892	53.2	37.4	32.0	41.6	54.6	57.6	52.1	50.8	81.5	51.4	59.8	50.3	53.7	37.9	32.4	57.3
893	65.1	38.5	28.6	27.3	61.3	61.5	58.6	53.2	88.1	53.5	60.2	59.9	52.8	25.2	41.2	77.1
894	73.1	26.2	36.9	30.3	63.5	56.2	53.2	61.7	84.6	58.9	59.6	61.3	51.6	40.0	32.8	67.7
895	62.8	32.3	32.3	42.6	52.2	65.0	63.3	58.4	83.9	54.1	50.2	53.4	55.3	40.6	47.9	78.2
896	53.7	35.4	32.0	38.1	55.3	58.9	63.5	59.2	87.7	51.7	61.2	51.6	53.1	28.0	45.4	79.8
897	79.0	34.5	44.3	44.6	57.5	55.8	52.2	50.4	85.2	53.7	60.0	63.3	51.5	48.9	34.9	58.4
898	79.7	27.1	35.6	33.4	50.9	57.2	53.2	63.8	88.2	58.3	57.3	59.9	51.3	46.8	26.9	72.6
899	50.2	48.6	26.0	26.1	54.3	50.7	60.5	61.2	81.0	61.6	62.3	51.8	55.3	38.9	39.9	52.0
900	67.8	48.0	33.2	39.7	50.7	54.7	56.0	57.5	84.4	56.4	60.3	63.4	50.1	30.7	49.2	52.3

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
901	52.0	45.2	27.0	25.7	64.4	58.4	59.5	58.0	80.0	59.0	61.2	51.4	52.7	32.1	38.3	53.8
902	74.7	39.6	27.5	30.6	50.4	55.4	60.4	50.6	89.1	64.9	64.7	55.0	62.1	42.7	26.6	78.0
903	62.6	32.6	38.4	45.5	56.1	64.7	58.0	55.1	87.5	51.7	59.9	61.4	57.0	44.7	40.0	72.0
904	61.6	37.4	35.2	37.1	51.1	54.6	53.8	56.2	85.2	60.2	56.5	57.7	54.2	34.1	47.2	51.4
905	76.7	40.8	44.2	35.4	63.6	54.0	56.8	51.6	86.6	50.7	61.7	57.8	64.6	48.8	46.4	54.6
906	67.6	44.3	27.1	34.6	54.8	51.2	51.1	54.0	86.5	60.5	54.3	61.4	61.0	38.6	38.2	66.2
907	62.6	33.8	31.4	39.4	62.3	55.0	54.2	51.2	86.3	56.6	64.2	62.1	54.7	40.2	26.6	58.2
908	58.2	39.1	49.6	33.7	64.9	54.2	51.0	56.1	88.2	58.6	55.2	61.7	56.6	44.2	43.8	74.4
909	62.4	26.7	47.2	36.7	53.1	54.9	63.1	51.4	89.1	62.2	54.2	50.2	64.0	40.9	42.5	57.9
910	62.2	42.8	36.4	41.1	59.1	54.2	57.0	56.9	87.7	57.9	62.8	54.8	63.4	46.9	40.0	63.6
911	54.6	32.0	28.4	36.1	53.2	52.9	63.1	66.1	87.2	59.8	55.8	62.2	63.5	33.5	30.9	74.5
912	60.3	48.3	27.5	31.1	61.1	64.1	64.5	59.6	87.3	61.1	55.8	54.8	58.5	40.6	44.0	50.7
913	72.8	47.1	34.9	32.4	58.1	63.2	51.6	59.5	87.7	62.0	50.8	56.5	61.0	44.8	33.2	69.9
914	69.7	30.0	40.2	46.0	61.0	53.6	57.1	59.9	85.7	50.5	64.0	57.8	53.6	42.8	35.2	78.5
915	61.1	47.6	40.0	25.1	63.2	57.2	56.2	64.5	88.9	61.2	54.4	52.8	56.6	32.3	45.2	73.3
916	52.7	32.5	44.5	44.9	62.2	64.5	53.4	59.5	86.4	58.1	53.7	54.9	61.3	25.9	25.6	60.0
917	68.5	41.6	35.6	42.2	59.7	63.7	61.1	58.7	86.7	63.4	56.7	53.1	52.1	46.5	31.5	55.2
918	77.3	47.0	25.4	30.2	50.2	55.1	56.9	53.1	89.2	55.1	59.4	55.7	55.7	28.2	45.4	62.8
919	63.2	30.7	25.6	32.6	59.4	58.1	57.2	52.9	88.1	57.4	52.1	50.1	54.9	48.4	40.8	63.5
920	67.0	31.0	26.1	46.2	62.8	60.2	54.4	60.7	89.5	63.0	59.8	55.6	52.6	46.8	25.8	67.7
921	56.3	36.4	43.7	29.6	62.7	56.8	64.1	58.4	85.3	63.8	61.9	53.3	63.2	37.2	26.9	59.6
922	57.7	47.5	26.0	38.7	54.4	53.8	64.5	54.6	86.5	50.2	51.2	62.4	53.4	32.9	45.2	61.9
923	68.1	26.4	31.2	46.9	57.9	61.8	61.9	64.5	89.5	58.3	62.0	53.9	63.9	31.8	27.6	65.0
924	67.4	34.4	44.2	37.5	56.5	56.8	54.0	53.0	86.2	63.5	50.5	51.7	61.0	30.8	33.9	68.2
925	66.6	33.9	48.4	39.5	54.7	59.2	60.2	52.7	88.3	63.2	60.5	64.6	53.5	41.6	31.9	58.4
926	52.1	35.1	25.3	27.2	50.2	54.8	52.7	63.7	87.1	54.1	52.3	63.8	64.8	32.2	49.5	60.0
927	72.8	33.7	48.5	26.0	52.0	52.6	63.5	51.0	87.4	56.3	57.7	50.1	56.0	38.1	39.4	68.7
928	73.1	39.8	42.2	40.4	53.0	55.7	52.1	64.6	88.4	64.7	62.8	56.2	59.2	26.5	44.4	79.1
929	59.9	39.9	26.9	45.1	61.6	56.4	61.9	53.8	88.6	59.6	56.5	63.5	55.4	38.8	37.1	75.8
930	59.5	42.5	30.4	44.2	54.9	54.3	56.5	57.4	85.6	58.0	60.8	60.4	50.2	25.8	35.4	70.3
931	65.4	29.7	44.8	34.1	61.0	60.5	64.2	63.1	87.2	52.1	52.8	50.6	59.6	39.9	32.8	63.6
932	59.7	48.3	48.6	36.2	64.0	64.7	60.2	62.9	87.3	60.1	54.8	58.5	51.7	32.8	47.4	58.3
933	70.5	41.3	44.1	46.3	63.5	51.5	57.4	61.8	86.9	54.1	61.2	56.2	58.7	31.1	46.1	59.6
934	57.7	33.2	41.2	28.7	62.1	60.6	62.7	62.4	87.2	60.4	58.0	60.6	63.7	45.9	49.6	68.0
935	51.1	38.6	43.6	42.5	59.7	57.0	53.5	59.2	87.9	55.3	56.9	56.9	51.4	28.1	42.3	74.3
936	68.3	32.1	42.8	47.0	56.0	51.6	50.5	56.9	86.3	58.7	50.1	60.1	61.7	41.1	37.5	71.7
937	69.8	37.4	36.8	42.6	57.7	64.2	56.2	64.3	86.5	55.3	64.8	60.9	56.5	26.8	29.9	60.8
938	73.7	33.5	41.7	38.0	60.2	63.6	63.2	64.7	85.0	62.4	50.9	61.3	54.2	33.3	25.1	75.9
939	71.5	35.1	37.2	33.5	60.1	51.9	51.8	54.0	89.1	59.6	60.0	52.0	60.5	44.9	47.2	67.2
940	53.2	35.7	31.6	37.1	53.9	61.0	57.0	64.8	89.5	58.1	51.3	51.5	55.7	31.2	33.8	69.0
941	75.5	45.3	46.9	43.7	56.9	63.4	61.1	54.9	88.7	63.1	53.7	61.7	60.6	30.4	46.0	65.7
942	51.8	31.4	42.0	39.2	59.9	64.1	62.3	52.8	85.3	63.2	59.7	63.1	53.7	43.2	25.6	70.2
943	65.6	31.1	38.4	42.4	63.9	52.6	62.2	53.6	90.0	50.1	61.6	53.9	51.2	35.9	30.7	69.1
944	54.3	28.9	41.9	35.7	61.7	62.6	56.8	52.8	89.0	59.6	60.1	55.9	50.2	39.8	26.7	60.6
945	68.6	35.3	47.1	38.4	58.9	58.7	52.8	50.3	88.9	54.5	55.7	50.2	62.8	29.2	49.7	72.6
946	69.0	48.0	26.2	34.7	60.5	57.9	56.6	64.3	89.9	55.1	56.2	51.2	57.2	43.0	35.3	63.5
947	75.3	49.5	28.6	31.4	50.4	53.9	61.9	55.5	87.4	56.0	54.5	61.0	50.3	33.0	29.6	66.2
948	54.8	27.2	47.4	43.0	51.0	56.7	58.2	54.4	88.1	51.2	57.2	55.2	64.7	35.9	25.8	79.5
949	72.3	25.2	47.5	35.4	55.2	54.8	56.7	64.2	88.8	58.5	54.5	64.9	64.3	43.7	43.1	75.8
950	75.9	38.1	34.4	26.3	51.2	53.2	59.9	62.0	89.1	55.1	59.1	52.2	51.9	41.1	44.8	74.0
951	75.0	48.6	39.3	43.5	62.9	60.5	57.3	61.1	87.7	54.2	54.2	54.3	62.9	49.8	41.7	71.2
952	68.3	48.7	33.2	31.6	59.2	59.3	56.9	55.5	87.8	61.6	61.3	53.3	61.9	44.2	35.9	62.9
953	74.7	31.0	26.3	41.8	60.7	53.2	56.3	61.6	88.9	63.5	63.3	57.8	62.2	44.3	26.8	65.8
954	79.4	28.4	34.0	41.1	55.9	55.9	57.2	64.4	88.6	51.1	52.8	61.7	58.7	28.1	35.6	71.2
955	72.1	45.0	31.6	41.2	55.8	63.9	61.8	53.2	88.9	62.9	63.3	57.9	51.8	41.6	29.5	71.6
956	68.9	32.7	28.2	37.7	63.1	57.2	56.0	60.3	87.1	59.1	64.5	60.1	58.5	41.8	43.5	70.7
957	70.3	39.3	39.0	29.0	51.1	57.5	54.2	59.8	85.6	51.9	52.9	56.4	61.6	43.9	28.7	69.3
958	67.7	32.0	35.2	34.8	56.6	56.0	54.2	51.2	85.4	62.0	54.1	63.8	64.1	27.7	27.5	68.2
959	65.1	29.1	36.6	38.6	57.0	58.6	56.1	56.5	87.7	58.0	55.6	64.1	52.8	38.7	42.7	66.3
960	74.2	44.2	30.3	37.5	50.8	50.6	53.5	56.2	85.6	56.0	51.7	55.1	63.5	27.4	34.2	77.7
961	73.7	25.5	37.2	29.4	54.2	51.0	57.2	58.4	89.0	60.4	51.5	53.2	59.2	42.4	48.4	67.4
962	78.5	30.6	39.4	43.8	52.0	57.9	57.7	55.9	89.3	61.6	61.5	61.9	55.9	39.4	41.1	64.4
963	74.0	28.8	28.9	33.7	58.3	56.0	53.3	53.9	89.2	58.7	61.8	53.2	62.3	41.8	41.8	68.5
964	77.1	44.0	35.2	28.4	56.5	55.3	57.2	59.8	85.9	53.0	58.2	50.7	56.1	30.7	46.1	68.4
965	70.2	33.2	26.6	27.0	60.0	52.9	55.8	53.2	89.7	53.8	55.7	52.0	54.7	32.9	25.5	76.3
966	72.0	42.4	39.3	31.9	57.2	55.8	56.5	51.2	88.3	51.9	52.8	54.4	61.5	32.8	37.8	76.2
967	70.6	43.3	32.5	37.0	53.1	54.8	51.4	56.1	87.6	58.7	58.3	59.2	50.1	42.3	43.6	69.4
968	73.5	26.5	43.1	29.8	57.9	58.9	57.3	58.7	87.9	50.4	62.2	52.0	52.3	25.8	44.3	66.6
969	76.7	42.1	26.9	30.1	57.6	55.9	59.1	56.6	89.6	50.6	50.6	59.2	55.3	47.7	40.2	60.4
970	73.2	43.6	41.1	32.9	51.7	53.9	55.1	53.0	89.9	57.5	64.8	62.8	55.2	49.3	31.7	77.4
971	71.9	34.5	39.6	34.1	58.8	56.7	50.7	54.2	86.7	58.4	50.2	56.9	63.4	29.5	45.5	64.0
972	72.1	25.4	31.2	33.5	53.3	53.7	59.7	51.9	88.0	61.6	50.0	52.8	63.8	30.5	39.9	73.9
973	75.2	34.4	40.9	44.1	57.8	56.8	56.9	53.3	85.2	53.0	59.9	53.1	58.0	32.6	42.4	64.6
974	78.4	37.5	34.5	40.4	53.6	58.2	52.1	60.0	88.5	55.7	54.0	52.9	50.8	45.2	34.8	60.2
975	78.0	42.0	36.4	44.5	52.7	51.3	55.1	52.6	86.2	56.8	58.4	54.0	58.3	27.8	43.2	78.3

mission	peak loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
976	75.3	34.3	40.8	26.9	52.3	59.2	57.1	59.4	85.5	57.5	51.1	53.4	55.5	44.1	44.9	79.6
977	71.3	28.4	25.3	37.7	55.3	57.0	55.9	57.2	85.7	50.9	52.5	55.3	55.0	33.3	35.3	71.8
978	70.1	35.7	36.0	26.1	55.4	57.8	58.3	57.2	87.4	56.1	53.3	59.3	59.4	31.7	43.1	76.7
979	76.3	35.4	38.9	28.1	50.9	55.1	55.4	58.9	87.3	54.0	59.7	51.9	52.5	49.1	28.5	78.3
980	79.1	35.7	35.5	28.3	52.8	54.3	55.6	54.8	88.6	56.0	53.0	52.8	53.5	36.7	31.3	64.5
981	76.6	42.8	32.7	26.9	53.5	56.3	50.0	51.1	86.2	57.4	53.7	50.2	57.8	36.3	45.6	63.7
982	77.1	36.2	36.8	37.2	58.8	51.2	54.8	50.1	87.1	58.4	58.7	53.0	53.4	25.6	38.1	63.7
983	78.8	38.1	26.2	29.8	51.4	54.1	56.6	55.3	85.2	50.7	50.5	51.9	53.9	42.2	25.4	72.4
984	77.4	42.8	30.2	25.6	50.6	53.5	52.1	53.3	88.0	51.6	53.8	53.3	55.5	44.1	26.3	64.1
985	76.4	41.5	40.6	40.2	52.6	54.9	54.8	54.4	88.6	50.9	52.3	51.5	59.2	38.5	43.5	63.5
986	75.1	44.5	36.5	35.4	54.5	54.4	54.4	50.3	85.2	55.4	54.3	54.3	50.9	33.7	38.7	61.0
987	77.7	37.7	33.5	41.5	51.4	51.4	53.6	50.4	89.3	58.2	55.7	55.1	55.2	28.8	33.7	72.7
988	77.1	26.3	33.3	34.1	52.1	51.6	53.3	52.8	86.2	54.0	52.3	50.2	51.9	44.0	30.5	65.0
989	77.7	30.7	30.1	37.5	53.8	53.5	53.6	51.3	85.3	52.0	53.5	54.8	55.7	38.7	44.6	63.3
990	76.6	25.4	42.2	36.6	53.4	54.0	50.3	54.6	88.9	50.9	53.4	54.2	52.1	44.2	29.7	61.1
991	78.3	41.0	33.6	33.9	50.7	51.0	53.2	53.9	85.4	53.6	51.6	51.8	54.4	37.2	27.2	63.2
992	78.8	34.8	33.5	34.7	51.8	53.4	54.7	54.2	90.0	53.9	54.4	54.2	53.9	43.3	43.1	60.9
993	79.4	31.3	41.1	41.7	52.5	53.7	50.3	54.7	88.4	53.3	50.3	54.8	50.1	41.4	26.3	72.7
994	75.2	42.7	44.9	42.3	52.3	51.4	52.6	54.0	87.4	50.2	51.5	53.2	51.8	26.8	42.3	77.1
995	77.6	44.6	40.1	43.2	54.6	54.4	50.7	53.2	88.5	51.8	51.2	52.6	52.4	43.9	43.2	71.5
996	75.2	44.5	44.8	45.0	53.4	52.5	50.6	50.1	86.6	53.6	51.0	52.7	50.0	44.5	29.8	79.9
997	78.2	43.3	42.6	43.8	54.7	52.5	52.2	50.7	89.1	54.5	50.4	51.0	52.5	40.2	42.4	71.2
998	78.2	41.0	40.4	42.5	52.4	50.8	52.5	54.2	89.9	54.9	53.0	50.6	51.4	41.8	44.2	73.1
999	75.2	42.1	43.6	43.1	51.7	51.0	50.6	52.5	88.9	52.0	53.9	52.9	53.0	40.5	40.3	73.1
1000	76.6	42.9	43.4	44.2	52.7	52.6	51.9	52.8	89.7	50.8	53.9	52.9	53.7	40.8	40.1	72.3

Figure C-3. Table of Valley Loads for Advanced Fighter Spectrum

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2.8	13.5	14.3	3.4	13.7	16.1	7.2	11.0	-21.0	4.0	7.9	3.2	14.8	7.1	19.7	0.4
2	-4.3	20.6	19.6	20.6	20.0	2.8	4.3	4.1	-8.4	16.3	10.3	23.6	3.2	4.5	18.7	-4.2
3	-7.2	2.2	3.0	9.8	16.8	18.9	19.2	22.2	-27.1	14.7	7.4	22.0	18.1	5.5	18.4	-9.3
4	-1.3	2.8	22.0	11.8	12.7	10.3	21.1	20.5	-21.4	22.7	17.7	1.0	14.9	9.9	16.5	-3.3
5	4.6	18.9	0.1	17.5	0.8	16.8	23.9	2.4	-11.3	16.1	1.7	4.0	2.9	21.0	18.8	-3.4
6	-2.9	22.4	3.9	0.3	22.7	17.0	12.8	3.3	-18.0	17.8	13.5	23.8	9.5	16.7	15.1	-5.5
7	-3.9	4.7	19.3	24.0	7.6	23.9	21.0	22.3	-18.6	18.1	2.5	9.7	19.2	19.0	7.4	-9.6
8	3.6	22.7	3.1	0.5	11.3	5.3	6.3	5.9	-17.1	20.4	14.8	0.8	12.7	15.2	9.7	0.0
9	-3.1	18.8	9.9	23.0	5.3	3.8	2.4	5.4	-29.0	11.1	19.7	8.6	5.8	2.2	0.7	-1.0
10	-2.6	16.2	18.1	23.3	15.9	7.4	20.6	9.5	-0.1	5.3	11.5	24.8	13.7	7.8	24.9	3.3
11	3.8	14.2	6.9	4.9	13.2	10.8	1.4	2.8	-7.7	16.6	10.9	4.2	14.9	10.3	19.3	-1.8
12	0.2	8.5	7.7	0.9	0.1	5.3	16.1	22.9	-26.8	3.0	16.8	22.5	15.4	9.1	14.7	3.5
13	-4.7	11.8	5.7	6.5	1.6	9.7	18.4	18.6	-7.5	11.8	7.3	9.0	12.8	20.0	12.7	2.9
14	0.2	23.6	16.4	12.1	3.6	5.2	20.5	7.6	-3.2	0.0	16.9	4.6	9.5	20.6	12.1	-6.2
15	-7.9	1.1	12.3	11.0	17.1	11.0	20.3	9.4	-8.5	4.8	12.6	19.4	3.6	20.4	10.1	-7.9
16	-2.3	4.0	24.2	7.3	17.4	13.2	2.7	2.9	-1.0	13.7	20.9	15.8	1.2	6.1	4.6	-8.2
17	-3.2	15.0	18.2	23.3	7.6	10.7	16.1	9.5	-12.5	9.7	3.9	16.0	6.2	12.4	20.0	-0.7
18	-9.9	10.3	21.7	8.1	8.5	10.0	24.0	0.8	-15.9	17.6	18.5	7.8	0.2	19.8	6.5	3.9
19	4.5	12.0	1.7	21.5	11.0	12.3	10.7	2.7	-1.1	4.2	0.7	1.1	6.0	18.6	21.1	4.4
20	-0.3	24.3	0.4	20.3	12.2	11.4	14.6	10.6	-16.4	15.0	24.7	2.8	17.4	9.7	18.4	1.9
21	3.1	11.6	0.9	0.1	5.4	16.2	24.8	6.5	-6.5	15.9	19.2	25.0	20.0	14.5	21.2	4.9
22	-5.6	18.2	7.4	0.1	14.0	9.1	16.3	1.8	-22.0	17.9	21.4	17.3	2.2	13.7	8.4	2.0
23	-2.0	17.1	3.7	7.2	10.0	13.5	21.0	12.2	-4.3	13.8	8.8	21.1	6.2	0.3	5.6	0.3
24	-2.3	17.1	20.8	22.4	5.4	6.5	11.9	20.1	-15.8	11.9	13.3	15.0	4.6	12.3	24.5	-6.9
25	-2.4	21.2	1.2	6.8	14.9	1.5	17.8	19.2	-6.5	17.9	10.1	10.0	1.9	15.7	2.0	1.8
26	-6.6	9.0	12.7	1.5	21.6	6.4	12.1	10.5	-14.7	18.5	7.1	19.8	11.0	12.0	13.9	-2.2
27	2.5	19.5	12.8	22.7	8.8	6.2	1.8	22.4	-20.5	13.6	8.6	5.9	4.9	21.5	14.4	-9.6
28	-9.3	9.4	12.6	7.5	20.7	20.6	16.7	5.5	-1.9	24.4	4.6	23.5	18.1	15.7	24.9	-6.9
29	-7.2	10.2	15.6	9.1	13.9	12.3	23.3	3.8	-19.7	1.3	9.7	16.2	23.5	0.4	23.1	-8.2
30	-6.3	11.8	7.4	16.7	9.1	19.6	14.0	24.4	-13.2	6.4	2.3	11.6	8.3	23.1	7.1	1.0
31	4.1	19.4	19.1	1.3	17.0	14.0	21.1	7.8	-1.2	21.8	13.7	16.6	1.5	6.3	9.4	1.6
32	1.7	12.3	10.6	10.9	16.0	8.2	5.8	23.7	-21.8	6.8	18.9	12.8	24.6	5.0	11.1	-2.0
33	-8.2	0.9	14.9	15.5	2.6	14.1	22.6	15.7	-15.4	6.1	16.0	1.4	18.5	14.7	5.8	0.1
34	-6.1	9.8	17.0	2.9	18.9	0.1	7.9	22.0	-24.9	7.8	9.9	24.1	20.2	3.9	13.8	-9.4
35	-3.4	11.0	2.5	23.6	3.4	24.5	19.2	20.8	-20.6	0.5	6.6	8.0	14.3	22.5	21.0	-2.7
36	4.7	5.9	17.7	11.4	18.2	17.8	24.5	0.1	-14.3	7.0	12.5	11.0	9.3	8.9	18.2	0.1
37	-5.9	9.0	13.6	3.5	0.0	16.1	15.8	3.6	-2.3	8.3	19.1	12.0	11.0	14.6	5.7	2.8
38	3.2	15.9	5.4	21.7	17.4	13.2	3.5	23.7	-3.8	4.6	21.4	21.9	6.1	23.3	7.7	-0.6
39	-6.4	23.3	17.2	2.5	19.7	14.9	13.2	14.5	-21.7	17.2	18.0	14.6	18.3	17.5	9.3	-2.6
40	5.0	17.7	0.2	1.8	0.2	19.0	11.8	21.5	-9.6	13.3	15.8	23.1	8.9	20.1	17.0	-2.1
41	-5.2	24.5	15.4	18.4	0.8	17.7	6.1	22.2	-17.7	9.8	9.5	7.8	9.8	9.0	22.6	-1.1
42	0.7	1.0	10.7	19.0	12.7	9.5	1.8	17.4	-1.5	16.6	5.4	10.3	21.6	14.6	4.4	0.9
43	-1.7	15.4	15.5	17.5	21.8	8.9	6.0	10.0	-15.9	4.4	20.8	4.8	14.8	9.8	19.4	-0.4
44	-7.6	19.1	14.2	18.9	15.2	0.6	23.4	2.2	-3.9	20.6	16.5	24.0	19.9	4.7	2.5	2.5
45	-3.7	10.5	3.2	15.3	1.8	2.4	22.5	8.2	-8.6	2.3	10.8	3.1	0.6	22.3	17.7	3.7
46	-2.2	16.4	15.9	5.2	6.6	21.6	23.1	3.1	-10.9	8.3	14.2	14.5	20.9	14.0	20.7	4.6
47	-1.4	3.2	13.0	14.6	20.0	12.1	14.7	11.3	-8.2	20.6	12.6	20.4	16.8	4.9	10.0	-2.6
48	-5.4	18.2	14.8	18.3	17.5	15.1	10.0	0.7	-1.4	16.6	8.4	14.3	19.5	21.7	2.1	-1.7
49	2.2	3.1	13.4	4.7	24.7	17.4	12.8	24.8	-2.6	15.6	19.2	5.5	22.1	10.7	23.1	0.9
50	-5.7	11.3	6.1	4.6	4.0	2.4	0.1	24.5	-11.9	14.2	20.7	22.8	20.8	9.3	5.7	0.4
51	0.8	2.8	22.6	21.0	19.6	1.8	17.3	11.5	-19.9	21.8	16.6	24.8	7.3	5.6	18.8	2.0
52	3.8	12.2	24.4	7.8	4.5	15.7	2.0	0.9	-10.7	20.1	4.3	15.7	10.1	14.0	17.1	3.4
53	-8.3	11.7	19.0	8.4	2.1	16.9	21.2	18.5	-18.6	1.5	20.3	8.5	13.3	5.6	24.6	-8.1
54	0.2	14.5	23.2	18.5	10.4	1.5	19.6	1.3	-0.3	17.4	23.6	8.5	22.7	6.6	19.2	-2.4
55	-3.0	9.0	0.7	10.8	20.4	24.2	2.1	12.2	-5.1	12.7	10.2	23.2	21.4	23.7	0.2	1.0
56	-5.7	8.5	21.6	3.0	8.0	0.4	10.1	19.9	-15.7	6.2	16.6	15.6	16.9	1.2	15.7	-4.8
57	-7.8	12.2	23.3	12.6	2.7	17.9	21.7	16.0	-14.9	11.1	14.2	0.9	23.9	15.7	21.7	4.7
58	-4.1	17.3	5.9	7.8	7.2	20.8	5.5	3.0	-11.6	6.9	19.9	23.2	2.1	14.0	24.0	-9.5
59	-3.4	1.2	5.7	3.2	18.6	14.7	12.5	7.5	-16.2	21.0	9.9	11.4	23.2	15.2	23.8	2.1
60	-2.7	7.5	8.7	22.6	1.9	7.0	0.5	9.8	-5.3	3.1	7.5	0.5	1.1	2.2	24.6	-6.1
61	0.8	22.7	17.5	15.2	22.4	10.0	9.9	20.7	-9.6	5.0	3.6	22.8	20.0	1.3	4.7	-9.7
62	1.0	0.4	14.7	14.9	20.2	8.3	12.9	7.2	-18.6	15.7	11.2	21.9	19.4	17.1	17.2	-9.0
63	3.6	21.1	14.2	14.3	3.1	24.5	7.4	10.3	-18.9	16.6	9.4	2.6	8.8	3.6	14.3	-2.7
64	-10.0	3.8	20.9	6.9	0.3	18.4	12.3	4.2	-6.1	13.0	18.9	11.8	17.6	1.6	10.7	-5.1
65	-9.6	12.4	13.3	11.6	10.0	14.7	23.5	3.8	-2.8	18.1	23.1	5.5	0.4	12.9	24.9	-2.2
66	2.0	19.4	5.9	14.2	4.4	19.7	10.4	8.1	-14.8	9.4	13.9	16.3	1.3	8.9	19.1	-5.8
67	-2.1	23.4	21.8	24.9	16.9	8.3	17.8	21.1	-18.6	17.0	23.6	8.3	8.8	12.9	8.2	-9.1
68	-0.3	6.6	9.2	20.3	16.5	24.7	13.9	16.0	-14.5	7.7	7.2	6.1	3.5	6.0	4.5	2.1
69	-7.4	9.6	7.3	0.5	13.7	16.3	14.5	23.6	-17.7	12.8	12.8	0.2	20.5	11.0	17.2	-6.9
70	-3.7	1.0	22.9	9.4	17.9	0.4	2.1	1.6	-5.4	24.6	19.0	9.0	3.4	19.8	8.7	1.6
71	2.1	20.4	6.8	23.4	3.9	11.0	13.1	19.8	-16.1	16.5	11.8	12.1	17.9	13.7	21.0	-7.7
72	-4.1	23.0	5.6	8.7	0.8	19.2	14.1	18.2	-17.6	13.5	11.1	8.3	16.4	8.7	2.2	-2.9
73	-2.9	4.3	12.9	4.3	6.2	3.5	3.8	14.8	-6.7	12.4	22.1	22.7	1.3	0.9	8.0	-0.6
74	-6.2	11.3	20.9	5.0	0.2	20.3	14.3	13.0	-6.3	14.0	19.2	15.6	24.0	20.1	21.4	1.7
75	-3.8	14.4	8.5	9.4	3.5	20.6	9.0	12.6	-11.1	9.6	8.6	10.5	12.7	17.4	2.9	1.0

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
76	-5.5	14.4	13.6	3.0	24.3	17.3	3.9	2.0	-12.7	2.6	22.6	0.5	2.3	23.8	8.8	-6.9
77	6.0	12.9	23.4	13.6	5.2	5.9	5.5	10.6	-17.3	7.2	18.1	16.3	17.3	12.3	13.9	4.5
78	-0.7	11.9	11.2	13.5	10.2	9.0	17.5	1.0	-19.5	1.7	14.7	19.3	12.1	24.7	18.4	-9.3
79	-7.3	17.7	11.4	18.1	24.2	0.8	2.1	17.1	-10.8	11.3	22.2	6.0	7.0	22.2	23.7	-0.2
80	4.5	11.0	1.0	20.2	10.8	21.1	10.5	7.9	-11.1	5.7	9.4	13.9	10.4	11.5	9.3	-4.6
81	-1.3	3.9	4.4	8.5	22.4	15.0	12.9	3.4	-10.5	16.7	17.2	9.1	24.2	11.1	24.0	1.5
82	-8.8	11.2	8.1	1.3	3.8	19.4	8.5	24.6	-13.0	13.2	6.1	4.1	16.2	23.2	22.6	-0.9
83	-6.2	18.6	24.4	17.2	16.2	6.4	0.2	24.1	-8.7	19.6	10.7	13.8	20.5	19.2	14.2	3.2
84	-5.9	8.1	0.8	7.6	8.6	5.2	1.2	10.2	-10.6	13.7	16.0	4.2	13.7	24.7	17.7	-0.3
85	2.9	17.6	14.8	1.3	17.4	23.3	7.6	24.4	-17.1	0.4	23.3	15.5	19.1	21.8	18.2	-1.3
86	-1.6	24.0	11.8	5.6	16.0	8.6	6.0	5.9	-2.7	6.7	24.8	0.0	19.5	12.8	7.5	-1.9
87	-7.8	9.9	5.7	6.5	19.2	5.7	2.8	15.1	-6.8	13.8	19.1	11.0	13.9	12.9	9.6	1.2
88	-4.1	4.1	3.6	24.5	10.6	12.9	7.0	2.3	-4.2	19.1	3.6	4.0	16.1	21.1	13.2	-8.6
89	3.5	8.6	6.0	20.9	19.5	10.2	18.5	1.1	-10.6	3.2	7.1	4.2	18.0	15.9	23.1	-3.1
90	-0.5	19.5	8.0	5.7	9.7	4.5	4.0	11.4	-7.7	1.2	16.4	14.6	3.2	24.8	19.8	-4.0
91	1.8	21.6	2.3	23.8	2.8	5.2	21.4	20.7	-8.2	9.2	11.5	15.2	17.0	14.7	12.7	-4.9
92	-6.4	2.7	0.6	19.3	17.4	22.7	18.2	15.5	-3.6	20.5	9.6	17.0	0.3	17.0	22.9	-3.2
93	-0.1	18.1	7.6	2.8	18.6	10.7	16.9	9.2	-17.6	2.7	10.8	18.1	15.4	6.7	23.4	-8.6
94	-2.7	20.8	15.7	23.4	19.2	5.7	19.0	21.0	-1.3	20.9	13.1	2.2	15.2	18.3	7.8	-9.9
95	-9.9	6.1	11.3	13.9	0.3	6.6	0.2	22.7	-10.0	4.2	8.9	9.7	6.5	7.5	11.4	3.9
96	-5.0	2.4	8.1	10.0	8.7	4.0	21.8	1.5	-10.8	24.8	23.9	2.5	14.3	20.1	14.1	-1.2
97	2.4	19.0	19.3	14.1	2.3	4.8	3.3	1.7	-11.8	16.0	20.5	18.9	6.1	11.7	22.9	-4.1
98	-9.5	9.4	10.4	0.5	8.8	20.9	19.8	19.1	-17.5	12.3	22.5	4.6	4.3	22.9	8.6	-2.3
99	3.2	23.8	0.6	0.4	1.8	18.6	12.6	0.1	-12.3	20.9	14.8	14.5	22.4	11.8	7.0	-7.1
100	-8.7	18.0	22.8	16.1	20.6	6.5	6.9	24.8	-14.8	23.4	19.6	21.0	15.7	24.3	8.7	-9.5
101	-0.9	24.3	14.0	12.0	24.0	19.0	1.6	6.4	-5.2	5.6	14.7	18.1	1.2	17.8	10.2	-6.5
102	2.7	11.6	17.2	18.3	4.8	21.0	11.1	5.3	-13.9	11.2	8.4	24.0	10.1	22.9	10.1	1.9
103	-9.4	3.4	19.0	24.5	18.2	20.3	22.5	23.0	-0.6	15.7	23.8	3.7	20.4	21.0	5.5	-6.0
104	2.9	7.3	23.1	19.5	14.3	0.6	9.8	20.7	-10.9	1.4	2.3	20.4	11.3	11.3	10.5	-0.5
105	-1.9	12.6	8.5	14.2	15.2	13.3	2.1	11.9	-16.1	23.8	19.4	18.6	4.3	19.6	15.4	0.5
106	-3.8	9.5	1.4	12.9	17.0	24.0	1.1	16.0	-2.8	7.7	7.7	11.2	0.5	16.1	6.0	-2.1
107	4.9	15.2	20.2	21.4	14.2	19.8	16.7	20.3	-6.8	11.1	16.6	20.2	14.4	20.3	22.7	-8.8
108	4.5	22.8	17.4	22.6	23.3	6.4	2.3	19.3	-18.5	2.6	20.1	5.3	6.2	12.1	15.2	-7.8
109	-1.1	0.2	20.9	19.6	7.9	11.7	4.2	10.9	-1.4	7.8	11.5	13.1	5.8	11.5	10.6	-5.6
110	-5.0	15.2	19.3	9.2	18.3	21.7	9.0	9.9	-4.8	0.9	4.3	14.3	1.8	21.3	21.4	-2.7
111	-1.1	8.5	5.6	11.3	13.6	11.4	3.1	1.1	-8.5	1.6	18.9	23.2	18.3	20.2	23.7	-1.6
112	-5.0	6.3	24.9	11.5	18.6	16.6	8.2	20.9	-4.3	4.9	1.4	21.8	13.6	13.3	9.8	-1.3
113	-2.2	20.0	20.3	12.9	24.9	18.8	5.2	21.3	-8.4	21.8	16.5	23.6	11.1	22.7	15.6	-3.1
114	3.2	11.8	16.4	10.7	24.4	8.7	9.1	6.6	-16.4	6.9	1.5	21.9	12.4	20.9	11.2	0.1
115	-9.0	14.2	9.8	6.7	4.4	9.4	4.0	17.5	-13.4	15.3	6.3	1.6	20.1	19.3	23.9	4.1
116	-0.4	23.7	2.9	10.1	2.6	11.4	9.3	19.1	-12.6	0.6	17.8	3.1	10.6	19.2	8.7	-5.2
117	-8.8	18.7	24.1	6.6	13.0	20.7	24.4	5.2	-17.1	9.2	13.7	10.3	8.4	10.5	5.7	2.5
118	3.7	25.0	1.6	8.2	24.6	1.8	18.1	23.5	-10.2	15.0	19.8	11.1	18.1	20.7	8.0	4.1
119	-7.0	3.7	9.9	21.4	5.0	3.0	11.8	0.6	-15.5	12.5	21.9	22.7	11.3	17.0	24.3	-8.4
120	-5.0	19.6	2.6	4.1	2.5	15.8	0.2	2.9	-9.2	24.8	19.0	18.6	23.5	24.5	16.0	-8.8
121	-4.1	7.5	12.4	1.0	13.2	10.0	20.3	9.0	-16.8	18.6	20.0	10.0	17.8	11.0	9.9	-2.2
122	-1.2	4.0	17.3	6.3	3.9	2.4	7.1	15.2	-9.9	5.0	20.0	14.6	0.6	7.3	13.5	2.7
123	-6.5	6.4	20.3	20.0	17.1	9.4	24.0	1.1	-8.1	17.3	0.8	13.9	18.6	7.4	5.0	-6.9
124	-8.2	14.7	15.1	16.1	13.1	8.7	11.9	20.9	-7.8	11.0	14.7	0.1	9.9	15.9	9.2	-9.8
125	-9.2	15.9	15.6	24.9	13.0	1.4	21.4	12.5	-10.9	17.2	16.4	7.2	8.3	11.8	18.5	-3.2
126	-2.8	21.3	8.5	15.2	15.0	11.7	19.1	20.2	-16.0	24.4	5.0	15.5	8.7	6.4	16.9	0.7
127	-6.9	1.0	17.4	16.1	22.8	9.2	17.5	24.5	-9.8	5.7	20.6	12.6	15.4	16.4	9.2	4.8
128	3.1	15.4	24.1	12.4	15.7	6.3	10.3	6.2	-13.9	19.9	20.0	6.9	5.2	6.7	15.6	-2.2
129	-4.3	8.2	16.7	12.0	17.0	23.5	18.1	11.3	-17.1	19.9	18.7	19.9	22.3	15.3	8.0	4.6
130	0.5	3.6	7.2	6.4	17.5	11.8	24.9	22.4	-14.1	14.3	11.5	22.9	6.1	10.4	11.1	2.0
131	2.2	5.9	23.6	18.6	6.0	7.0	9.7	0.6	-19.4	23.9	21.2	23.1	3.4	10.2	12.2	0.8
132	-1.5	1.5	12.6	16.2	19.9	1.8	15.4	2.5	-1.3	23.2	1.1	0.2	21.4	24.8	18.2	-7.3
133	4.4	18.3	4.6	4.5	10.2	23.6	5.8	22.1	-11.3	4.0	13.9	22.2	21.6	11.7	13.2	-3.7
134	-1.9	12.8	3.0	0.7	19.5	22.8	21.5	12.7	-16.3	19.0	17.5	15.9	18.1	8.5	7.0	-8.8
135	-4.8	6.1	5.3	17.4	16.6	5.9	18.4	20.3	-3.3	6.2	16.7	14.8	18.3	13.1	18.6	3.8
136	2.7	11.4	24.6	0.4	17.5	20.5	10.3	16.1	-2.0	16.3	14.5	11.7	24.5	8.5	13.7	-6.6
137	-9.2	14.7	19.7	9.1	12.6	0.3	10.6	15.0	-17.0	16.7	0.7	16.5	1.0	17.1	23.2	-6.9
138	-4.6	22.9	18.2	19.6	20.7	4.7	11.9	5.6	-3.3	1.1	3.5	23.1	1.4	21.9	22.4	0.6
139	-3.1	5.6	17.1	13.5	5.7	21.7	24.3	6.2	-16.0	0.4	15.7	21.5	20.7	12.0	10.0	-6.9
140	2.5	8.7	8.2	20.1	15.2	19.2	18.7	6.4	-5.3	7.0	1.8	17.9	7.3	15.1	24.2	0.1
141	-8.9	14.8	2.6	5.0	1.5	16.5	24.6	17.2	-4.4	5.2	20.9	24.5	23.1	14.2	20.9	2.2
142	-2.5	9.5	3.2	22.3	2.2	16.6	14.8	8.0	-7.1	17.9	16.6	9.0	17.3	5.6	16.1	-0.4
143	4.1	21.7	5.0	13.6	1.8	4.1	21.3	19.6	-11.1	5.8	13.7	17.0	23.3	9.1	11.8	3.2
144	-1.2	17.9	3.3	7.8	12.1	5.2	12.2	18.9	-12.4	10.7	15.0	20.1	10.7	22.9	8.5	2.8
145	-2.0	2.4	10.1	6.9	12.0	17.9	21.9	23.0	-8.7	11.2	7.1	13.3	11.1	21.8	12.8	-2.8
146	4.5	20.3	22.9	24.2	9.7	18.3	5.9	20.2	-4.6	20.0	1.4	6.0	7.2	12.7	11.7	-8.3
147	-0.5	2.0	15.1	22.4	15.1	21.6	13.4	20.2	-15.8	22.5	8.1	10.2	11.8	8.5	18.9	0.1
148	-8.5	20.3	7.4	14.9	23.9	10.6	13.8	20.7	-12.9	22.5	11.4	19.5	22.9	10.9	16.8	1.8
149	-0.9	19.0	18.3	9.3	24.9	9.0	2.3	18.1	-15.2	15.9	22.7	4.9	9.9	24.6	15.8	-6.5
150	-5.7	13.2	22.7	2.0	16.5	13.1	4.3	23.9	-9.7	0.9	9.9	14.9	0.4	11.3	20.9	-4.1

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
151	-1.4	2.7	12.3	9.9	10.9	11.1	8.8	23.5	-11.9	1.9	20.0	0.1	15.6	5.8	20.6	0.1
152	-1.2	6.6	14.0	17.3	1.7	23.8	1.7	14.9	-3.5	13.6	8.8	9.3	4.4	21.5	24.9	1.9
153	0.9	16.2	3.5	17.2	16.7	8.2	18.1	20.7	-15.0	17.3	24.8	6.0	21.8	24.1	14.2	0.4
154	-1.4	2.6	5.0	5.9	3.2	3.9	12.6	0.8	-19.7	9.7	15.4	4.7	11.3	8.3	21.1	-5.9
155	2.2	5.0	17.2	20.7	21.0	1.4	5.2	2.9	-13.1	4.1	1.3	13.2	3.3	16.5	12.4	-9.4
156	2.0	4.3	23.6	6.5	8.8	19.8	8.0	7.2	-3.0	11.4	2.8	2.7	7.5	21.2	11.9	3.5
157	-9.6	3.0	0.1	17.3	9.1	19.9	12.5	0.7	-10.7	12.5	1.8	5.2	14.9	21.0	7.1	-2.7
158	0.0	19.9	20.8	2.6	10.0	8.3	13.7	9.0	-5.6	11.5	17.3	13.8	19.6	19.3	12.9	-3.1
159	-5.6	1.5	14.6	19.1	16.5	6.9	1.2	8.3	-3.0	12.6	17.2	23.0	2.1	18.2	13.8	-7.0
160	-10.0	14.0	11.8	1.6	15.7	7.6	4.4	9.9	-2.8	15.6	8.6	14.0	22.6	19.4	12.4	-3.9
161	-1.0	18.8	13.3	12.5	23.1	24.1	2.7	4.3	-13.5	22.2	5.2	1.5	14.8	19.2	8.4	-3.5
162	-6.3	19.9	20.4	22.2	24.3	18.4	18.8	6.7	-10.6	18.8	13.7	3.5	1.9	15.8	23.5	5.0
163	-0.9	21.8	2.8	3.2	19.4	8.5	1.6	24.3	-12.6	6.4	13.4	19.0	3.0	23.4	9.6	2.3
164	-0.8	17.1	9.3	22.5	15.3	10.5	1.3	4.3	-10.7	24.9	20.5	18.5	10.3	22.3	18.8	-2.0
165	-1.2	0.4	14.7	17.8	14.0	9.8	3.9	24.8	-3.1	9.3	1.3	18.0	9.7	23.9	19.4	0.3
166	-0.9	11.2	13.0	22.6	0.8	13.7	5.3	19.8	-10.1	7.9	21.3	3.4	19.1	20.3	7.1	-1.2
167	-3.3	12.2	9.8	9.6	2.0	0.7	7.0	16.7	-5.3	5.3	7.3	14.4	10.9	10.2	17.6	-0.8
168	-7.7	5.1	0.5	7.8	1.2	15.7	4.7	0.6	-8.8	5.7	5.4	4.6	1.7	22.4	17.2	-7.5
169	-7.1	4.3	18.0	17.6	24.9	7.6	10.2	14.0	-1.5	9.1	4.9	21.7	8.5	23.3	24.6	-1.3
170	0.1	24.6	8.9	8.8	2.2	23.8	18.4	5.5	-3.6	23.9	20.3	24.6	15.3	24.5	22.8	2.5
171	4.6	21.4	0.1	10.1	4.7	16.5	21.7	5.4	-10.7	0.1	7.0	6.4	8.6	19.4	20.4	0.0
172	1.7	2.8	18.6	6.5	21.4	6.2	14.6	23.7	-2.4	18.3	24.1	4.5	5.6	14.8	19.0	-0.5
173	-4.3	10.7	17.4	6.0	8.9	20.8	19.6	12.5	-5.7	5.3	18.8	3.6	17.1	6.2	9.6	-3.6
174	-3.4	21.6	19.8	23.1	22.6	21.0	23.6	6.1	-9.5	20.5	24.6	19.6	16.9	5.7	21.0	-4.9
175	-5.6	17.7	22.1	16.7	19.7	2.0	17.0	5.0	-7.1	23.8	22.6	21.5	22.7	17.4	24.8	1.1
176	-2.6	0.3	21.9	2.6	23.3	3.4	16.9	19.2	-0.6	0.3	2.6	21.4	12.3	11.3	20.3	-0.4
177	-7.1	3.0	5.6	11.3	9.5	10.8	7.7	3.5	-1.6	9.2	7.1	1.5	20.3	12.7	17.0	-4.3
178	-1.3	1.0	5.8	5.1	9.8	2.5	8.1	6.8	-6.6	8.5	7.2	1.1	9.7	19.0	5.4	1.8
179	-3.8	4.0	24.7	17.2	15.4	21.6	14.7	18.1	-0.6	19.3	22.9	5.2	3.0	9.5	19.0	-7.1
180	-2.5	23.6	3.6	16.1	0.5	6.0	8.4	0.6	-2.1	19.6	1.8	15.8	6.2	9.2	15.9	-9.2
181	-3.6	23.1	21.9	11.5	17.6	24.6	4.2	10.2	-4.6	1.2	21.5	23.9	17.7	12.9	16.0	1.4
182	-3.6	23.0	2.3	7.0	2.4	2.4	24.3	15.3	-11.7	23.5	10.6	14.2	15.2	10.8	9.3	-0.5
183	-4.3	24.8	13.8	7.7	20.3	12.5	16.2	7.6	-0.8	9.9	10.7	19.1	5.6	22.3	8.3	-7.0
184	-7.3	20.7	12.4	2.5	20.8	12.0	11.1	2.1	-10.1	8.1	10.6	7.3	18.6	15.7	6.0	-8.9
185	-1.1	7.6	18.1	18.0	21.0	18.5	6.8	6.2	-9.3	10.3	18.6	1.1	20.9	21.3	10.9	1.7
186	0.7	21.1	7.3	1.5	7.5	4.4	22.8	12.4	-3.1	9.5	15.5	20.4	13.5	7.7	10.3	-6.5
187	4.0	13.1	12.5	17.9	7.7	14.7	1.3	1.2	-5.4	18.2	18.0	23.9	8.8	11.1	14.1	4.1
188	-0.5	11.2	6.5	20.7	9.0	15.5	5.7	17.8	-6.5	2.9	20.0	18.3	2.9	23.0	10.5	-4.8
189	-0.4	15.1	4.2	6.4	4.6	1.2	13.9	9.1	-6.5	20.3	3.8	12.4	0.4	13.3	6.6	2.9
190	-5.1	21.1	22.5	23.5	13.4	12.6	6.6	17.0	-11.3	15.0	3.5	21.6	1.6	13.7	24.7	-2.4
191	-0.2	2.9	21.2	9.9	24.4	7.3	3.6	6.4	-12.6	13.3	1.5	1.4	6.2	6.3	8.9	-5.8
192	-8.6	12.6	10.3	21.3	1.0	11.5	19.9	6.0	-1.2	3.0	17.5	24.4	20.6	9.6	7.6	-2.1
193	-0.7	13.1	23.7	2.1	17.6	21.3	2.6	3.3	-0.2	2.7	1.3	4.1	23.3	19.1	8.7	-7.3
194	-3.3	17.7	8.3	5.5	4.7	11.4	0.6	10.8	-4.5	12.0	11.7	2.8	14.7	17.4	22.0	-3.0
195	0.0	13.4	6.3	3.7	7.9	4.3	19.7	14.4	-2.8	21.7	21.7	23.8	9.4	18.3	18.8	-2.8
196	-3.2	5.3	22.0	3.2	5.5	12.3	18.7	21.5	-9.2	10.3	5.7	1.6	9.3	15.3	19.5	0.3
197	-4.6	23.6	24.7	18.8	13.7	12.5	7.6	16.4	-0.8	13.8	21.3	18.3	22.5	19.7	13.6	-2.2
198	3.9	22.5	24.3	21.5	21.4	13.0	13.3	12.4	-0.3	5.1	8.1	5.7	24.4	22.8	16.8	-5.5
199	-6.8	1.5	1.1	15.4	9.5	24.0	5.9	9.0	-9.7	5.9	17.2	18.8	23.3	9.9	9.4	-3.3
200	-4.0	20.6	2.1	22.0	17.9	10.4	6.3	11.6	-8.3	10.8	4.1	18.1	24.1	9.4	20.2	-9.3
201	-1.5	7.6	11.9	24.5	8.3	7.7	19.8	18.6	-13.3	13.8	10.9	13.4	17.7	13.8	5.3	-9.8
202	-1.3	20.6	12.5	17.1	17.6	16.3	22.7	24.1	-10.0	18.0	12.0	9.5	19.3	23.6	18.0	-6.2
203	3.7	16.4	13.1	20.3	15.6	0.7	2.6	13.3	-12.2	13.2	1.0	0.6	3.4	18.2	16.5	-9.8
204	2.4	2.3	2.0	3.4	8.7	0.4	16.5	12.9	-7.1	0.2	21.7	15.2	24.8	11.1	9.0	-9.5
205	-0.8	21.5	19.8	5.5	5.4	7.4	3.4	11.7	-5.6	14.0	17.9	16.7	17.3	13.9	22.0	-1.8
206	-9.3	4.8	23.1	6.5	18.1	14.5	20.1	12.9	-14.0	20.9	1.8	8.9	21.4	17.9	6.6	-7.7
207	-1.9	24.3	6.1	12.4	8.3	14.6	9.1	8.0	-1.9	3.9	21.1	19.7	23.8	6.3	13.7	2.6
208	-0.5	22.6	1.0	0.2	21.6	17.7	24.7	23.4	-4.6	10.3	9.6	21.9	9.5	5.9	23.7	3.3
209	-1.1	3.8	0.3	18.0	23.3	4.9	1.5	22.9	-1.4	16.7	10.4	2.5	11.7	21.0	17.4	-9.8
210	3.1	21.2	11.3	14.6	22.5	23.8	1.1	6.2	-10.4	5.7	3.1	6.3	0.7	19.1	19.9	-7.4
211	-2.2	24.4	19.7	20.7	14.8	4.2	22.6	17.8	-4.2	7.3	21.1	1.6	10.4	9.4	6.3	0.2
212	1.5	8.7	6.9	16.2	13.0	20.7	20.4	1.1	-7.1	6.7	7.7	3.6	13.1	13.6	7.7	-9.0
213	-9.4	2.0	14.1	18.4	8.0	17.2	24.6	22.0	-11.1	7.5	13.8	17.2	13.9	11.8	22.0	4.6
214	-2.9	24.0	19.0	2.9	13.6	13.2	12.1	1.6	-3.7	19.1	2.3	16.5	24.8	6.1	10.5	2.0
215	2.7	18.3	18.5	24.0	18.8	3.1	7.7	22.1	-5.3	17.4	17.1	17.8	0.5	8.5	7.9	2.9
216	2.9	1.5	11.4	15.0	5.7	9.5	22.3	13.6	-3.5	3.6	17.1	5.2	23.2	23.9	20.2	3.0
217	4.9	8.0	7.8	6.0	20.6	5.4	4.2	14.9	-8.7	21.5	7.6	22.9	7.6	24.2	24.7	-6.4
218	1.9	16.7	13.1	8.5	6.7	0.5	0.2	9.6	-5.5	16.9	12.5	4.3	21.1	8.1	24.3	5.0
219	1.6	1.7	0.3	24.8	19.8	17.7	5.7	2.5	-10.5	24.6	8.5	22.9	7.6	6.6	20.9	-8.0
220	1.2	8.9	19.1	7.8	7.7	1.1	0.1	23.6	-7.5	15.5	22.6	16.2	14.5	12.4	23.5	3.3
221	-4.6	19.2	19.2	10.3	24.4	6.0	20.7	10.8	-6.5	3.7	5.8	15.6	21.0	14.5	21.9	2.4
222	-6.1	14.2	4.9	14.8	20.9	6.7	16.9	14.2	-8.5	22.4	11.3	7.0	11.1	8.6	9.6	1.3
223	-1.7	23.6	8.7	24.0	9.3	3.7	15.6	19.1	-4.5	10.6	4.5	11.6	18.6	11.6	15.2	0.9
224	0.9	9.2	0.7	15.0	1.8	2.0	13.7	8.5	-0.2	23.6	15.1	7.3	5.8	7.6	15.5	-2.9
225	-3.3	17.5	4.5	9.1	17.1	1.6	1.9	5.0	-4.4	18.6	11.9	10.6	21.4	17.0	12.8	-3.2

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
226	4.5	5.8	1.3	11.7	2.6	16.8	1.2	16.4	-1.3	10.5	9.5	17.9	5.7	16.1	5.4	-9.8
227	1.1	3.8	22.3	10.8	4.1	2.4	20.1	11.2	-10.2	19.3	21.8	20.9	18.2	24.5	11.4	3.4
228	-7.9	14.2	4.8	18.3	15.2	15.3	18.0	2.1	-11.2	12.0	1.8	15.1	17.6	6.7	6.0	3.1
229	0.4	2.9	19.5	22.6	9.4	23.9	3.7	22.5	-4.5	21.9	4.1	1.9	1.0	6.5	7.6	-2.7
230	-3.8	14.2	16.7	7.0	2.5	8.5	6.5	6.5	-2.8	0.1	20.1	5.9	18.9	7.4	18.1	3.5
231	-0.1	21.3	13.0	14.5	13.0	12.0	18.6	11.6	-7.9	22.8	20.3	2.0	1.6	9.9	13.2	-6.9
232	-5.9	7.1	8.9	17.4	16.5	17.2	16.0	18.7	-14.5	14.0	16.6	11.1	22.0	12.7	22.9	2.0
233	-4.3	5.3	25.0	16.3	13.5	22.4	9.7	18.6	-14.3	7.0	15.3	9.4	14.2	13.8	24.7	-6.3
234	-4.9	16.7	4.8	13.6	2.7	12.3	6.0	20.3	-6.3	5.3	24.5	2.5	17.1	12.0	11.0	-9.8
235	-8.3	17.5	9.4	11.2	23.1	16.8	13.5	2.8	-6.2	9.3	2.1	8.0	23.2	14.0	21.4	-8.9
236	1.6	8.1	18.1	2.3	18.2	11.1	3.2	9.4	-7.3	1.2	16.8	13.8	2.2	17.5	8.4	-7.5
237	-1.9	22.3	13.6	23.1	17.7	9.6	17.7	15.0	-6.4	14.5	10.3	8.2	21.6	23.7	8.8	-2.5
238	3.0	2.9	18.0	9.2	11.8	3.8	14.0	5.6	-10.6	4.8	10.6	17.0	20.1	10.0	6.4	-3.9
239	-0.5	24.0	7.8	10.2	23.4	12.7	16.7	16.3	-6.1	22.5	13.6	14.6	20.0	11.4	9.0	1.7
240	-7.7	0.3	12.0	0.8	10.3	3.8	20.3	17.3	-5.2	3.2	14.5	1.5	4.6	14.3	13.5	3.8
241	4.3	14.6	9.8	3.6	9.9	12.2	0.7	10.5	-14.4	7.5	2.1	8.6	17.8	10.8	10.3	-9.5
242	-0.3	4.9	16.5	23.3	5.7	19.5	0.6	17.8	-7.2	21.3	22.4	20.7	24.7	8.6	16.3	3.5
243	3.3	5.3	20.4	11.1	10.2	18.1	9.6	3.4	-3.3	19.2	22.5	8.3	12.7	6.4	13.2	-8.8
244	-7.5	0.0	13.1	17.0	11.3	11.5	19.9	10.6	-9.2	14.1	12.9	6.3	6.7	14.4	24.4	-7.0
245	-2.7	11.7	22.2	1.3	10.7	13.5	5.4	20.7	-3.0	23.0	23.7	18.6	15.6	8.6	21.3	-4.2
246	-5.0	5.4	8.9	20.4	12.7	11.6	6.9	6.5	-11.3	19.8	20.1	24.6	11.0	20.2	5.6	3.3
247	-4.2	1.6	21.8	19.9	6.1	13.3	3.0	0.6	-6.9	2.7	3.6	6.4	5.0	21.5	12.0	-0.8
248	-3.4	13.2	20.2	13.4	9.4	22.0	7.0	3.6	-7.6	16.7	20.0	1.6	15.3	24.4	11.7	-4.4
249	2.0	3.7	22.0	4.1	20.7	3.5	24.7	4.1	-8.9	7.8	18.8	2.4	13.9	20.9	16.2	-7.4
250	0.7	18.8	15.4	23.9	0.9	14.6	14.0	17.3	-2.8	9.5	23.7	9.8	10.0	18.2	10.3	-0.7
251	-3.0	15.6	11.1	18.4	12.3	1.2	19.8	11.9	-11.6	21.9	0.1	4.0	15.2	7.2	23.2	-3.4
252	-0.1	5.0	18.1	22.1	8.6	7.5	18.2	16.8	-4.9	3.3	22.1	15.8	8.6	10.8	12.6	-9.0
253	-8.1	10.8	8.0	23.2	19.9	18.2	17.0	16.6	-6.2	20.6	19.2	8.5	12.6	8.9	12.3	2.3
254	-5.8	24.1	16.5	14.0	19.3	15.2	11.1	22.8	-4.2	8.0	22.1	2.6	20.1	19.8	18.0	-6.0
255	1.9	4.3	20.1	16.6	1.5	22.5	2.4	24.1	-13.0	12.9	17.4	5.3	22.8	20.6	14.4	-7.1
256	-7.7	9.8	15.7	23.5	22.1	6.0	5.3	0.3	-8.1	5.0	1.0	23.2	24.1	12.5	7.6	-4.0
257	-4.6	19.4	2.9	0.9	0.7	10.3	17.2	0.3	-13.8	6.4	6.4	8.9	13.8	9.3	14.3	-3.3
258	-1.5	10.6	1.8	1.0	10.2	7.7	10.5	21.7	-0.8	17.8	15.8	18.7	13.4	18.2	23.7	2.3
259	-5.5	12.1	6.5	7.6	6.8	0.7	15.9	23.9	-12.7	15.6	18.3	5.4	10.3	9.7	18.2	-9.3
260	-6.9	5.2	23.0	7.9	3.5	10.6	9.9	16.2	-6.8	23.4	22.6	21.8	6.8	17.5	20.0	-8.0
261	-6.1	2.3	4.4	4.0	2.0	15.8	0.5	9.0	-7.4	6.8	20.0	3.2	15.4	22.0	10.5	1.3
262	5.0	0.7	5.7	15.7	21.0	6.4	16.2	12.5	-2.7	24.7	3.6	3.8	22.9	24.4	24.3	4.5
263	-7.3	10.7	14.0	10.7	24.0	17.1	18.7	23.1	-4.5	10.2	8.8	5.4	12.1	8.6	5.3	-5.4
264	3.8	23.1	18.9	1.7	7.9	20.4	8.4	1.4	-12.2	16.0	15.0	18.0	21.5	8.9	10.0	-4.1
265	-2.7	24.0	24.9	24.6	1.4	23.4	13.6	7.3	-2.6	19.1	13.0	5.4	24.8	23.1	23.0	-8.4
266	3.6	16.6	9.9	11.0	3.5	14.9	5.1	23.5	-9.5	24.6	19.3	6.9	17.8	11.5	13.5	2.5
267	0.1	11.6	10.9	22.3	14.9	4.8	13.4	1.2	-7.1	5.9	13.9	7.4	20.3	16.3	7.4	2.0
268	-1.0	22.3	12.5	2.0	6.1	12.4	15.8	10.5	-3.1	4.1	3.4	12.2	7.7	13.1	11.9	3.8
269	-8.3	21.3	5.1	6.3	22.7	9.4	6.6	8.6	-11.3	16.0	13.5	21.1	17.6	10.9	7.0	-1.9
270	-4.6	8.9	9.6	11.8	13.6	4.2	6.6	21.4	-2.9	17.0	15.0	22.3	6.5	19.7	24.1	-3.3
271	1.5	12.6	11.3	1.4	8.1	15.9	22.1	13.4	-0.8	19.5	11.5	0.9	20.1	15.7	18.0	4.5
272	2.8	3.6	13.8	15.0	5.6	13.6	8.5	13.9	-3.0	16.5	21.1	12.0	18.9	13.1	7.9	-5.2
273	-4.5	0.2	10.5	12.7	3.2	24.2	21.8	20.4	-6.4	4.5	18.8	1.2	21.6	12.9	22.8	-9.9
274	4.8	13.5	18.9	7.0	17.1	24.3	2.2	2.2	-0.6	11.4	24.1	9.4	9.5	13.9	9.1	-9.3
275	2.4	23.3	2.2	24.6	14.6	19.4	18.3	14.7	-6.2	20.2	7.5	5.2	15.0	12.4	7.3	-7.2
276	-3.8	21.6	3.1	14.4	22.1	4.4	22.2	15.9	-4.9	24.1	4.4	23.4	7.2	18.8	14.0	2.5
277	-0.9	8.5	4.0	13.5	2.5	12.2	17.2	5.7	-5.7	17.2	23.5	14.5	8.7	19.7	23.9	1.0
278	-5.9	11.1	20.9	15.6	3.2	19.2	12.1	0.4	-1.3	21.0	6.3	10.3	19.6	17.3	7.9	-2.2
279	-1.8	23.5	14.0	0.5	5.9	3.8	21.5	24.2	-9.9	10.8	17.6	24.5	19.2	7.3	10.5	0.8
280	-1.2	22.2	10.6	1.5	21.3	16.5	13.2	2.3	-14.3	18.3	13.0	10.4	3.4	17.1	7.4	-2.2
281	0.4	18.5	8.6	9.5	2.2	15.3	22.8	2.1	-6.9	22.7	5.0	19.9	15.3	12.3	20.5	0.6
282	-2.8	15.1	14.2	0.0	11.3	16.1	12.7	23.7	-6.9	0.3	19.1	6.4	17.2	11.3	18.4	3.6
283	-3.7	21.8	8.9	9.8	24.0	17.3	1.8	4.5	-1.8	20.4	18.5	17.2	9.9	5.9	10.6	-4.8
284	1.1	6.5	8.9	12.3	12.7	8.0	21.8	8.5	-13.2	6.7	1.7	9.9	11.5	21.8	21.6	3.2
285	-5.4	10.0	19.3	13.0	13.3	16.7	4.2	7.8	-11.9	0.2	18.8	3.0	17.7	15.3	9.8	-6.5
286	-4.9	17.0	19.9	7.4	11.8	0.5	3.5	17.5	-6.0	18.8	10.6	5.5	4.3	6.5	19.4	2.8
287	0.3	24.0	8.1	21.3	19.1	6.1	1.6	19.2	-11.1	21.7	22.2	4.9	9.6	8.3	14.9	-1.0
288	-8.9	15.4	5.4	23.1	20.6	11.4	14.2	6.2	-8.6	14.1	19.8	16.8	18.9	9.8	19.2	2.0
289	-9.9	24.4	3.9	5.3	11.2	3.2	23.7	19.7	-5.0	19.2	3.4	18.0	18.6	9.0	5.9	-2.3
290	2.7	14.8	23.0	15.9	21.9	1.0	21.6	21.1	-11.0	11.4	15.0	11.9	9.1	24.0	7.0	3.6
291	3.9	18.9	24.9	24.6	24.6	18.8	24.3	9.3	-12.4	24.1	13.2	22.3	2.5	10.2	9.7	2.9
292	-2.3	13.8	7.5	21.8	11.1	11.0	15.0	2.4	-6.5	20.9	16.0	20.4	19.8	7.7	17.0	2.3
293	-2.9	2.1	2.2	22.8	0.3	10.5	16.2	20.8	-3.2	5.2	12.7	19.0	3.9	13.3	19.2	-1.6
294	-3.2	8.9	0.9	5.1	19.7	4.4	17.8	20.4	-12.6	21.0	19.6	17.8	17.7	17.9	16.0	3.8
295	-0.3	22.9	24.6	13.1	18.2	21.3	18.9	3.4	-1.0	6.8	17.4	8.7	18.0	8.2	11.9	0.2
296	-0.2	16.6	3.0	24.4	9.5	17.0	11.2	10.6	-2.9	4.7	5.4	10.5	15.4	19.2	23.4	-3.4
297	0.3	21.9	18.5	11.9	12.1	10.7	6.2	17.7	-2.0	0.5	6.5	0.9	2.8	22.6	7.7	-3.6
298	2.9	21.6	18.6	20.5	9.5	4.3	19.2	2.1	-8.6	1.7	16.7	6.9	15.3	5.9	16.0	-3.3
299	-4.3	12.3	10.9	22.1	6.4	4.2	22.0	6.0	-7.8	24.9	16.4	14.1	24.7	21.2	23.4	-0.6
300	4.4	7.0	6.8	2.2	22.8	17.9	24.1	0.7	-3.1	17.3	1.1	16.7	16.6	7.3	21.7	-1.9

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
301	-5.2	22.0	15.5	14.7	16.8	20.4	18.8	7.7	-8.2	3.1	16.6	18.8	17.1	5.4	10.9	-1.0
302	-8.1	2.7	6.0	16.9	21.3	4.4	15.0	3.3	-2.3	9.3	24.2	11.9	8.2	5.7	11.5	0.6
303	4.5	1.3	23.1	17.7	1.0	14.6	18.9	15.4	-8.6	23.9	22.4	15.4	2.6	5.9	6.1	0.3
304	-2.5	20.9	11.7	3.6	20.0	23.6	14.0	10.8	-2.7	5.3	22.5	2.6	9.9	16.7	20.2	3.4
305	-2.4	23.2	4.7	10.3	1.4	19.8	7.0	13.8	-4.2	11.9	5.4	10.9	6.0	15.1	10.9	-1.6
306	-3.1	11.4	5.5	2.0	2.2	9.9	2.0	20.1	-4.5	14.2	5.2	16.9	14.2	6.2	17.3	-4.8
307	-2.2	5.2	16.9	18.2	17.0	13.7	8.1	0.2	-11.9	10.2	3.8	5.8	13.3	9.5	21.6	1.1
308	-3.8	20.0	17.3	23.8	8.5	4.4	14.3	8.2	-12.9	17.0	20.7	9.7	2.3	6.1	9.8	2.5
309	-1.7	24.3	15.9	12.4	3.8	4.6	9.0	15.6	-10.6	4.2	23.6	6.2	14.1	9.7	16.9	-0.4
310	-4.9	4.9	18.7	0.3	18.9	13.1	14.4	13.0	-5.5	9.6	8.8	5.4	3.1	22.8	22.8	0.5
311	-8.0	14.2	8.9	16.9	17.0	23.5	1.4	1.1	-9.3	3.2	1.6	4.6	3.2	24.3	8.8	-1.8
312	-3.2	0.8	14.6	11.1	21.4	19.8	16.9	6.8	-3.0	17.8	21.6	16.0	15.9	13.4	9.3	2.0
313	1.7	8.7	0.6	3.6	4.4	4.4	17.5	7.2	-9.8	0.8	5.0	5.4	16.0	11.1	8.3	-1.8
314	4.2	9.8	23.9	12.0	9.1	21.8	14.5	11.6	-4.9	5.8	3.5	20.5	5.7	19.1	6.3	0.8
315	-2.0	0.9	3.1	18.6	21.5	9.3	8.0	22.3	-10.0	6.4	13.4	19.0	0.5	16.8	20.0	2.7
316	-4.0	23.5	0.2	11.8	1.7	2.0	9.5	18.0	-4.4	3.4	7.5	1.1	10.3	14.3	21.0	0.1
317	0.8	5.8	12.0	21.1	12.4	13.3	12.0	14.7	-3.1	19.3	19.8	1.8	20.2	24.7	5.1	0.0
318	-1.0	4.8	13.1	19.8	0.4	21.5	2.5	23.3	-8.4	3.4	24.5	15.7	13.8	8.6	6.7	2.4
319	0.6	16.4	4.2	2.4	11.0	9.9	7.1	1.4	-2.7	0.3	6.8	15.6	11.2	16.6	11.7	0.6
320	0.8	5.2	20.5	6.4	3.0	9.2	6.8	13.4	-1.9	13.4	8.3	10.0	13.4	15.5	13.0	-0.5
321	3.5	6.8	17.9	3.4	13.5	14.0	18.9	24.3	-9.6	3.7	17.4	2.4	12.5	20.0	9.7	3.6
322	4.4	12.4	0.6	17.8	12.7	5.9	15.5	15.0	-8.6	22.5	18.1	6.7	3.4	22.3	11.3	-2.7
323	1.5	17.3	4.2	1.4	24.9	23.2	8.1	22.6	-5.9	4.4	20.8	10.8	14.1	8.6	10.8	-3.1
324	1.3	21.4	15.5	15.0	18.4	9.0	15.4	23.4	-5.2	9.1	14.9	25.0	17.0	17.5	14.1	-1.5
325	1.2	23.8	10.4	22.4	18.9	8.8	9.3	1.3	-7.3	3.2	9.2	22.7	13.3	23.2	6.0	-0.5
326	2.7	4.0	7.4	21.2	0.2	15.2	19.0	17.4	-6.4	5.8	3.2	6.6	2.8	11.6	7.4	-2.9
327	-4.6	6.3	1.4	14.0	1.9	14.4	22.5	11.1	-7.5	7.2	23.0	23.3	5.0	11.8	22.3	-0.9
328	-1.7	14.8	21.5	18.1	6.3	6.0	5.4	3.2	-1.4	16.5	14.9	19.5	3.4	15.6	19.6	2.7
329	-4.6	4.8	1.2	10.7	21.6	24.0	11.7	18.9	-1.1	5.4	10.3	3.0	3.8	14.1	23.0	-2.4
330	1.9	18.0	4.3	19.5	9.1	15.4	23.7	24.3	-4.1	8.4	2.7	13.2	20.2	13.1	7.7	0.9
331	-0.7	10.0	23.3	13.0	18.3	1.3	4.1	18.2	-2.2	16.7	13.8	20.2	16.9	10.9	24.3	-1.8
332	3.8	19.7	15.0	16.0	19.8	19.5	5.5	14.0	-12.7	3.0	4.2	18.8	6.8	19.2	17.0	-2.7
333	-3.0	18.9	12.0	13.5	4.1	22.5	17.4	14.2	-11.0	6.4	6.2	23.8	19.0	6.8	6.2	-3.1
334	-4.7	19.1	23.6	17.5	5.1	12.1	8.6	19.7	-5.7	10.3	19.7	5.1	6.7	9.5	7.5	-1.5
335	4.0	2.4	16.5	15.5	2.2	12.3	24.2	14.2	-4.9	7.8	0.0	2.6	14.6	13.4	18.5	0.2
336	-2.5	5.9	4.5	17.8	9.9	5.8	12.7	23.8	-6.4	0.3	17.1	11.6	25.0	9.2	8.8	-1.9
337	-4.4	6.8	12.4	18.4	3.2	20.8	4.6	24.8	-0.2	13.0	0.1	19.2	5.9	13.3	23.5	1.5
338	2.9	7.3	4.9	18.0	0.8	24.7	16.7	3.1	-11.0	2.6	12.5	10.5	2.3	16.6	21.3	2.5
339	2.0	2.1	8.0	13.6	10.5	21.1	15.8	4.7	-0.9	6.5	18.1	3.8	20.0	22.0	19.8	-1.4
340	2.6	23.3	14.1	0.4	8.3	15.2	3.9	19.0	-9.6	11.2	24.0	10.5	11.1	19.6	18.1	-3.7
341	-4.1	22.7	1.7	21.3	24.3	0.9	11.2	23.8	-11.3	5.2	16.9	11.7	16.8	21.9	9.9	-3.7
342	-0.1	1.5	22.4	7.2	14.7	5.6	16.1	20.6	-1.0	23.5	20.1	11.7	13.2	24.1	8.3	-2.1
343	2.3	14.1	22.0	21.0	1.1	3.5	16.4	13.4	-4.2	3.7	23.3	17.9	8.0	5.9	13.4	-1.4
344	-1.5	6.3	23.1	10.8	1.4	14.7	13.7	21.1	-12.3	19.7	13.2	14.4	19.7	23.0	17.9	4.6
345	1.5	16.6	23.8	9.7	18.5	5.9	2.2	3.5	-11.1	18.8	4.9	13.8	8.9	10.5	22.3	-4.6
346	-3.1	23.1	10.8	10.6	11.6	18.5	18.0	23.5	-12.0	8.9	9.2	4.4	18.7	21.1	22.6	0.0
347	-3.4	15.7	22.6	4.4	2.0	3.2	23.5	2.7	-10.4	15.3	13.9	21.7	9.4	14.3	8.0	0.3
348	-2.2	4.1	18.0	16.5	23.9	6.9	13.5	22.8	-2.9	8.7	14.1	18.6	3.9	22.8	20.3	-4.5
349	-2.0	7.1	7.3	13.5	8.9	24.0	0.5	13.4	-3.6	4.5	2.1	20.3	22.1	22.3	15.0	-2.3
350	2.2	20.9	2.2	11.6	15.1	18.6	9.4	2.2	-8.8	16.5	9.9	9.3	16.7	21.1	9.4	-0.7
351	3.7	23.1	17.0	14.3	7.1	21.9	1.8	21.5	-2.0	3.3	14.2	11.8	9.2	6.0	20.0	-3.6
352	4.8	6.5	4.8	15.6	16.8	10.9	3.6	19.5	-6.6	11.0	23.7	6.6	1.2	22.2	20.4	3.6
353	0.8	24.7	9.8	20.7	9.6	9.6	9.2	17.5	-14.2	2.5	14.6	3.0	7.5	18.6	5.7	-1.7
354	3.3	11.5	9.4	9.1	11.4	14.4	11.5	9.6	-6.0	11.3	8.8	2.3	11.8	11.1	18.5	1.6
355	1.4	15.2	4.6	13.9	17.8	19.6	11.8	24.0	-1.9	14.0	11.5	22.0	8.0	20.1	14.4	-4.4
356	-2.4	6.7	3.6	17.4	22.4	18.2	4.7	6.4	-11.5	24.8	6.2	17.5	18.7	17.7	5.7	4.5
357	4.4	3.5	0.7	17.2	1.5	9.1	21.8	14.8	-10.0	14.8	7.4	21.1	20.4	20.7	8.3	-0.3
358	-4.3	1.2	14.7	5.2	15.5	22.8	11.3	4.8	-11.1	0.7	9.6	11.4	4.2	18.9	5.5	-2.3
359	1.9	12.7	23.3	2.7	3.2	16.1	21.8	12.7	-3.5	24.6	17.1	6.2	4.4	19.2	10.3	4.0
360	-3.9	11.6	7.5	20.0	2.0	18.8	24.7	12.3	-2.7	5.2	11.5	19.9	13.9	20.2	18.7	1.7
361	2.4	18.9	12.5	3.0	20.5	9.0	14.6	5.0	-2.8	4.4	21.8	25.0	8.2	6.2	23.2	1.0
362	-1.0	11.1	20.9	18.6	9.0	11.3	23.9	17.6	-11.2	1.5	8.8	3.8	14.6	24.4	22.5	-0.5
363	-3.8	6.5	21.4	9.8	4.3	5.4	17.0	14.2	-8.2	14.4	3.9	1.6	24.8	10.3	15.2	2.5
364	-3.4	19.4	19.5	9.9	19.5	17.6	17.5	0.2	-3.9	4.1	12.0	17.9	24.5	13.6	11.9	2.1
365	3.6	10.2	17.1	6.3	19.5	13.5	21.6	18.7	-6.8	4.1	9.2	13.5	10.0	14.4	24.3	0.7
366	1.9	23.6	15.7	18.1	6.8	6.0	17.5	21.9	-7.7	1.6	0.3	2.9	17.2	10.6	13.5	-3.9
367	-4.3	5.0	15.7	13.5	20.3	4.5	10.2	18.0	-12.2	13.5	16.0	15.9	15.4	6.3	7.7	0.0
368	-2.9	17.7	7.2	24.1	2.2	11.6	5.4	15.6	-1.7	19.7	23.0	0.1	23.0	22.0	10.0	1.2
369	-2.6	7.8	24.1	22.8	7.5	11.8	13.9	10.9	-9.6	6.8	8.4	12.5	8.7	18.1	14.6	-2.9
370	2.0	21.4	20.8	11.3	16.0	5.3	18.1	23.8	-8.5	12.8	12.6	15.1	8.7	10.8	23.0	-3.3
371	-2.7	19.9	9.0	11.0	2.4	6.2	19.8	16.8	-14.9	2.4	16.9	19.5	8.1	7.6	17.4	-2.8
372	1.0	24.1	9.2	15.1	15.5	20.3	5.3	1.0	-5.2	22.8	18.6	4.6	14.8	22.9	20.5	-0.1
373	1.2	6.9	24.4	20.1	9.4	9.8	13.2	23.7	0.0	0.3	19.9	22.3	13.4	7.6	24.7	4.4
374	-4.0	8.5	6.5	24.3	9.2	22.2	4.6	8.6	-7.1	15.5	5.1	20.8	9.4	5.3	11.0	3.4
375	0.3	6.2	11.4	9.5	0.3	3.3	19.3	17.5	-3.8	13.9	19.5	10.0	4.3	16.4	5.5	0.8

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
376	-1.0	9.5	14.8	22.3	3.9	8.2	12.9	7.2	-5.3	24.9	2.1	2.8	3.3	5.8	7.3	-3.7
377	4.6	22.0	10.7	18.9	5.6	13.7	15.5	3.0	-11.1	0.7	5.4	0.9	1.9	10.0	14.0	4.3
378	2.0	10.4	10.5	14.6	3.8	20.0	14.4	16.7	-5.2	1.1	24.8	22.2	15.6	7.1	7.2	3.7
379	-0.5	9.3	21.6	7.6	20.9	8.7	16.2	19.9	-3.9	9.3	15.1	9.5	9.6	20.4	22.8	-4.2
380	1.4	15.2	12.9	6.3	9.8	17.4	24.4	7.5	-10.5	19.6	8.5	12.3	1.8	6.3	9.6	1.2
381	-0.1	25.0	7.2	11.8	15.5	13.2	7.4	7.9	-11.8	17.7	11.7	6.4	7.1	24.4	13.0	-0.6
382	-3.0	19.1	25.0	14.1	24.5	4.0	20.1	21.3	-7.7	4.2	10.6	5.1	24.6	11.1	17.0	2.7
383	1.0	5.1	20.2	6.4	17.6	6.3	5.2	7.6	-9.0	4.6	6.9	6.1	22.3	20.4	17.9	4.1
384	-4.2	17.2	23.3	7.3	9.9	19.2	10.5	15.9	-8.8	21.1	0.9	14.1	9.9	13.2	24.3	-4.8
385	-1.2	17.3	24.6	6.1	21.7	4.0	17.2	1.9	-7.6	1.1	19.0	10.5	20.4	7.6	9.7	1.4
386	0.0	17.4	15.3	15.6	2.0	24.3	18.9	8.5	-3.5	9.9	17.6	2.2	1.1	5.4	21.6	-3.1
387	-1.7	23.0	13.2	7.7	5.1	12.0	15.0	0.9	-13.7	17.7	1.1	16.6	2.7	10.6	13.4	1.7
388	3.0	21.5	10.8	11.2	4.0	16.1	13.7	17.5	-1.5	11.2	1.8	6.2	18.7	8.3	19.9	4.7
389	4.7	7.5	7.3	8.7	4.6	5.0	5.9	19.9	-0.1	8.2	20.8	14.3	18.3	21.2	5.9	-2.0
390	0.2	18.2	12.1	9.8	12.3	14.0	17.0	13.6	-9.1	21.8	7.0	14.1	16.2	21.1	10.8	2.9
391	-4.3	19.3	20.0	17.3	8.8	12.9	8.7	14.7	-10.2	21.5	16.0	16.6	19.9	19.1	18.4	0.2
392	0.5	10.9	22.7	21.4	13.0	16.4	0.7	3.1	-8.6	2.3	7.8	1.8	16.5	22.3	11.3	2.7
393	-0.6	6.7	7.3	7.6	1.0	24.9	24.9	4.7	-10.4	10.8	17.9	2.2	22.1	12.6	22.2	4.2
394	-4.9	24.1	12.1	15.5	9.2	10.1	11.1	6.2	-12.8	19.2	14.0	15.6	2.2	7.9	14.8	2.9
395	-0.2	19.5	6.7	23.6	17.2	18.7	21.8	21.1	-4.7	6.6	5.0	11.8	11.3	13.0	10.9	0.0
396	0.6	19.5	24.6	23.2	7.5	6.6	18.9	1.5	-8.8	19.6	6.5	10.9	17.5	18.3	9.9	4.0
397	4.8	23.9	22.5	23.4	4.5	12.4	9.1	24.8	-12.3	1.6	15.3	21.6	16.3	18.4	23.1	2.9
398	4.9	13.3	12.5	5.2	22.8	12.9	9.3	10.3	-10.5	23.8	8.5	15.1	13.4	14.2	15.2	4.0
399	0.0	7.4	13.6	6.2	14.1	12.1	3.7	23.1	-14.9	11.2	14.2	20.7	0.6	18.1	22.3	-4.0
400	0.0	24.7	16.7	10.9	22.3	5.4	3.4	19.7	-5.2	3.8	15.6	15.9	17.1	21.2	10.8	-4.6
401	-4.1	7.6	20.4	9.5	17.4	6.2	21.7	9.6	-4.6	6.1	10.3	24.5	15.8	10.2	24.8	-1.1
402	3.2	17.7	11.4	7.3	2.8	17.0	20.2	6.4	-1.9	22.2	3.7	13.7	14.7	16.3	15.0	-0.1
403	-1.0	15.4	21.2	6.2	3.3	2.7	15.0	19.8	-5.7	6.1	8.8	10.4	5.9	23.9	13.2	2.5
404	0.9	25.0	7.2	10.2	11.3	15.4	16.2	5.5	-13.9	13.9	9.2	11.8	0.1	22.3	22.5	2.1
405	3.0	16.6	22.6	17.7	12.4	23.7	6.1	20.2	-10.8	8.4	9.7	3.7	1.3	20.8	11.9	1.7
406	-1.3	17.6	18.3	7.3	21.7	18.7	13.4	0.7	-4.0	5.8	13.9	20.6	3.3	16.5	17.9	-4.4
407	2.4	12.1	11.4	14.9	17.7	21.6	17.8	22.7	-1.6	11.5	6.1	23.1	2.4	18.0	12.1	3.0
408	-2.6	17.2	24.3	13.2	7.4	0.5	23.0	17.9	-1.1	12.5	10.5	5.3	2.3	16.5	9.7	-3.2
409	-1.6	21.7	17.8	22.9	7.1	22.7	8.5	0.3	-9.9	23.5	5.6	5.7	13.6	7.0	24.8	-4.3
410	-4.9	17.4	12.5	13.5	21.7	22.6	2.3	23.2	-11.6	0.4	3.6	22.6	17.0	22.2	11.8	-2.7
411	1.2	7.9	6.4	12.8	4.8	18.9	11.7	14.1	-12.1	14.2	10.5	24.1	14.0	22.9	16.6	1.6
412	-1.7	20.8	21.4	19.0	3.4	16.6	13.1	13.6	-1.6	13.4	2.2	23.4	16.9	15.2	5.9	-4.8
413	1.5	14.2	16.4	21.3	10.7	16.2	6.9	8.5	-4.6	12.6	3.1	20.0	14.7	16.0	17.5	-0.9
414	4.5	15.9	17.1	10.9	10.3	1.1	12.7	7.9	-8.3	20.9	6.8	16.5	4.2	19.9	13.7	5.0
415	-2.8	10.0	22.5	5.3	3.2	24.7	23.7	23.7	-6.6	6.3	13.7	22.5	13.8	18.0	7.8	-4.4
416	-4.8	22.4	9.9	24.4	2.2	5.6	11.6	5.2	-8.6	22.9	0.9	10.1	1.9	9.2	20.9	2.1
417	-3.4	18.3	23.0	20.9	2.2	19.3	14.3	22.2	-4.3	18.3	5.4	10.9	24.6	23.3	19.7	-1.0
418	0.7	5.0	19.9	11.4	15.3	9.0	8.6	20.9	-7.1	18.4	6.4	14.3	16.1	18.1	14.6	4.3
419	-1.0	19.3	9.4	21.5	19.7	21.4	9.7	8.5	-2.1	13.6	1.7	7.0	7.1	11.3	9.4	1.8
420	2.4	23.5	14.5	5.2	18.2	19.4	22.4	0.7	-14.1	12.1	20.3	3.8	12.8	6.7	15.1	0.9
421	4.8	8.5	8.4	14.0	24.1	23.7	0.3	14.8	-11.3	17.3	22.6	4.9	13.2	10.8	12.7	-3.4
422	-3.8	15.4	9.4	16.9	15.0	23.0	20.2	2.6	-1.1	24.4	12.4	13.4	8.8	13.4	17.8	2.8
423	-4.2	11.8	7.8	20.1	23.1	8.9	18.9	9.1	-0.5	23.9	18.6	2.9	1.6	8.3	9.3	-4.2
424	2.4	5.4	17.5	12.9	12.0	21.1	1.3	21.0	-2.8	24.8	14.2	19.4	3.6	11.8	17.4	3.7
425	-3.7	6.2	9.8	9.4	20.9	4.9	6.3	12.8	-2.3	19.8	1.8	9.6	16.7	14.6	6.5	-1.3
426	1.9	25.0	18.1	13.7	13.9	16.6	3.7	19.5	-4.5	22.0	12.1	10.4	1.2	23.8	20.1	-0.6
427	-1.9	20.2	14.8	14.3	13.0	19.2	3.2	12.2	-14.7	20.9	4.5	21.6	4.9	9.2	7.6	-0.9
428	-4.8	15.8	13.2	12.5	4.0	19.0	0.5	15.5	-9.4	14.2	15.5	5.8	13.7	16.0	18.8	4.8
429	3.0	17.2	14.0	19.9	15.7	21.2	15.1	7.9	-0.4	21.0	23.0	9.8	21.5	16.7	16.3	3.8
430	2.8	17.9	10.9	15.1	6.1	0.1	13.3	12.9	-9.4	3.7	24.8	5.1	22.8	10.3	19.0	-1.7
431	1.9	8.6	22.5	18.5	11.5	1.1	10.0	2.7	-4.4	24.2	5.3	12.2	6.7	7.6	22.5	0.5
432	-2.8	9.0	12.2	20.7	8.4	1.6	4.6	21.9	-6.3	3.1	17.1	17.0	12.9	22.2	6.0	-1.6
433	1.7	9.2	15.5	17.4	12.4	18.1	13.2	5.2	-6.2	8.1	22.9	1.2	23.5	9.8	21.1	0.9
434	-4.5	8.3	24.9	8.5	10.1	13.9	16.6	10.2	-6.5	6.9	8.7	24.1	6.3	24.9	5.7	0.2
435	-1.0	23.6	17.5	14.7	15.0	10.3	13.5	12.0	-1.4	13.5	2.5	16.6	8.3	20.2	19.7	1.0
436	-2.5	8.0	8.5	7.7	18.6	24.7	19.9	17.1	-10.8	5.1	13.6	4.1	8.0	7.3	20.7	-4.4
437	3.6	13.4	22.7	18.6	16.9	9.3	18.8	10.9	-5.8	21.1	18.0	9.7	11.0	6.5	8.4	-0.1
438	-0.7	13.7	13.0	15.3	8.6	10.3	6.4	2.8	-6.0	18.1	10.6	14.7	4.9	8.6	5.5	4.4
439	0.7	14.0	23.2	8.7	14.3	22.1	1.7	6.5	-11.8	23.1	24.7	15.8	17.2	13.4	14.5	-4.5
440	0.2	14.1	21.3	8.7	21.1	13.8	15.7	2.8	-9.8	22.2	20.9	1.1	11.2	7.1	19.3	2.2
441	-2.6	21.7	13.5	11.0	6.1	22.6	2.0	7.3	-12.6	13.5	14.0	7.4	22.3	15.0	14.6	-2.6
442	-4.7	7.0	14.1	16.1	15.3	17.4	9.5	23.8	-6.6	20.8	5.6	20.6	8.8	15.5	16.3	-2.0
443	2.3	11.0	8.8	16.2	22.3	4.4	14.4	19.9	-6.6	0.3	24.4	11.2	11.8	12.3	11.1	-1.3
444	-1.5	21.6	10.3	5.5	21.1	1.9	1.9	10.0	-4.4	11.1	8.7	14.9	2.3	8.4	10.2	-3.3
445	-4.1	19.7	10.7	6.7	6.3	5.6	4.8	23.0	-2.9	17.0	20.1	18.6	14.0	8.1	22.1	3.9
446	-3.7	6.2	11.2	10.1	9.4	10.5	14.4	13.0	-14.1	21.4	3.3	21.1	7.8	9.2	15.0	-4.6
447	2.7	5.2	15.7	19.0	2.9	0.1	3.4	6.7	-9.9	3.3	22.6	15.6	14.2	10.0	17.2	-1.8
448	0.1	8.4	7.0	15.7	2.0	24.9	20.6	6.0	-11.7	0.1	19.2	13.0	5.1	23.9	18.7	-4.3
449	-3.1	12.1	24.0	15.0	8.6	2.8	17.1	8.3	-0.6	21.5	8.0	12.6	8.0	16.1	19.7	-4.2
450	-3.5	15.7	21.5	13.2	18.3	2.1	10.8	2.3	-3.3	7.7	7.2	21.3	7.0	22.9	16.1	-4.3

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
451	-1.3	10.4	10.5	10.3	10.4	0.4	23.3	10.9	-3.6	11.1	9.7	0.9	11.9	11.3	23.1	-1.5
452	3.5	10.6	13.0	19.1	11.8	10.4	11.1	10.1	-2.3	8.5	2.4	14.0	8.3	10.7	7.1	-2.2
453	-4.7	22.7	20.7	10.9	14.7	16.1	11.2	14.4	-10.6	22.0	5.6	2.6	5.6	20.3	13.2	-2.1
454	5.0	24.6	22.0	10.6	6.3	3.5	13.5	23.7	-10.1	4.5	16.3	3.3	22.3	9.2	24.3	3.8
455	-3.7	21.2	11.4	11.1	21.6	13.7	13.8	9.2	-12.0	20.8	17.3	25.0	10.3	7.5	20.2	-0.3
456	4.4	0.0	16.9	24.3	10.8	5.1	6.2	18.5	-8.1	3.5	3.8	9.4	17.0	18.5	8.3	-1.1
457	0.7	23.4	15.0	21.4	11.4	18.6	2.3	9.7	-14.1	23.3	3.4	2.6	15.6	22.7	23.4	2.2
458	-1.7	13.0	9.7	15.8	7.5	20.4	21.0	3.6	-12.7	3.2	5.1	0.9	17.1	6.9	14.9	-0.3
459	4.5	8.9	11.3	13.0	6.7	21.2	10.4	10.0	-5.0	9.4	5.2	22.9	20.0	20.7	22.9	-4.1
460	-4.9	11.6	8.4	22.2	2.2	21.4	12.3	21.0	-7.8	23.9	10.6	14.5	7.7	24.7	19.1	4.8
461	-0.4	17.3	5.0	17.1	10.8	5.9	22.0	7.8	-10.2	22.8	2.8	4.1	0.4	5.3	6.7	-4.6
462	4.0	15.1	11.0	11.5	13.4	13.9	11.9	13.3	-0.8	2.7	10.9	3.5	7.8	19.7	14.4	4.6
463	-3.3	18.9	19.8	21.7	9.8	2.3	8.5	10.9	-11.5	18.4	14.2	24.6	24.7	23.8	12.9	3.5
464	0.5	7.9	14.0	7.7	10.6	14.4	3.5	20.5	-2.2	9.2	15.5	14.2	12.3	9.5	22.6	-3.2
465	-4.5	17.6	17.2	8.4	4.5	6.4	5.4	0.8	-1.9	7.1	24.6	2.1	7.9	16.5	12.9	5.0
466	-0.5	10.7	6.6	7.1	1.3	16.2	12.8	2.2	-13.3	5.2	23.1	9.9	3.9	10.5	17.4	-3.2
467	2.2	24.9	7.6	10.5	11.7	8.1	7.4	25.0	-1.5	22.2	5.4	22.6	12.4	20.7	6.0	4.0
468	-2.1	5.5	6.3	23.3	10.8	0.8	18.5	14.9	-13.2	1.4	19.5	4.5	21.3	8.1	15.5	-0.8
469	2.9	20.9	5.8	9.3	19.5	20.9	15.0	18.4	-14.5	7.1	19.6	5.6	8.1	5.7	18.7	0.3
470	2.0	8.4	19.1	22.1	2.4	2.2	15.3	15.3	-4.1	9.7	17.3	14.5	21.9	14.1	12.0	4.9
471	0.5	7.4	21.6	8.6	8.0	9.0	12.5	1.8	-14.6	10.7	14.4	22.0	18.6	21.3	14.3	2.3
472	-1.5	14.6	24.7	22.9	13.9	14.2	17.2	21.0	-8.3	18.1	10.1	15.3	17.4	16.0	17.7	-3.6
473	-1.7	8.0	14.0	6.3	5.5	15.6	3.4	17.2	-0.5	17.2	4.5	8.6	21.2	6.8	8.4	2.1
474	3.3	24.9	14.1	19.9	15.4	14.3	9.8	22.7	-1.1	8.8	12.1	7.0	12.4	14.1	17.6	-1.3
475	2.0	15.6	16.4	5.6	12.2	13.6	16.9	10.4	-4.4	0.7	20.0	13.3	23.0	15.7	5.8	4.7
476	-0.7	14.3	10.1	24.8	24.3	20.9	11.1	0.5	-4.0	18.8	0.6	20.3	22.1	16.7	20.8	1.7
477	1.4	17.3	7.6	11.0	8.1	4.8	13.4	19.6	-0.1	6.8	12.0	15.1	2.9	17.8	5.3	-2.8
478	-3.7	12.6	15.6	9.5	13.4	20.3	13.5	8.3	-0.1	0.3	24.2	7.4	22.2	22.2	24.3	-2.5
479	-1.2	18.9	7.3	12.1	0.2	12.3	4.7	2.1	-10.6	1.8	12.6	23.5	4.3	22.1	17.3	-2.9
480	-4.5	16.5	14.7	21.0	9.0	14.4	3.3	4.2	-12.3	22.4	0.4	8.4	21.5	13.1	22.3	2.1
481	0.4	22.2	23.5	8.8	8.6	16.4	4.6	9.3	-5.0	22.4	17.6	1.5	23.1	21.5	15.6	2.6
482	2.9	10.0	21.3	20.1	0.9	9.5	10.0	1.2	-10.0	15.0	13.0	6.9	2.3	13.4	10.2	-1.7
483	4.0	11.8	13.8	18.7	9.7	22.0	12.2	0.2	-6.2	3.5	5.0	9.6	19.9	10.1	8.5	0.3
484	-4.5	10.6	15.8	7.2	11.4	16.6	8.8	0.1	-1.5	3.1	6.0	20.5	8.6	18.0	22.5	-2.8
485	-4.1	23.2	5.8	17.2	19.0	16.7	9.6	22.4	-7.8	15.6	24.9	15.4	11.7	19.9	11.2	-3.1
486	-0.6	24.0	24.5	13.8	6.0	24.1	1.5	0.1	-8.0	6.6	19.8	3.9	5.2	14.5	14.1	2.8
487	-1.0	8.4	7.0	18.3	17.7	0.5	6.4	16.1	-1.6	18.5	2.0	17.3	14.8	10.6	19.6	3.8
488	0.4	13.1	16.1	16.6	7.7	16.2	13.0	16.0	-2.7	16.1	20.5	6.1	6.0	21.9	10.7	1.1
489	0.8	21.9	5.6	8.4	13.8	7.4	6.2	10.1	-6.3	20.3	3.1	4.5	22.3	12.2	14.3	3.9
490	-4.3	9.0	13.2	6.5	2.1	21.0	21.7	23.8	-11.4	2.5	10.4	19.5	4.6	11.5	17.6	2.8
491	2.4	10.8	10.5	19.6	7.1	11.5	12.0	12.8	-9.3	0.9	21.1	21.4	7.8	12.9	21.8	4.0
492	-4.4	9.5	12.0	8.8	12.8	24.0	1.3	16.7	-7.2	21.2	2.3	7.8	1.2	24.5	6.9	-2.6
493	2.9	24.3	12.7	18.0	14.0	21.6	9.2	19.9	-7.1	0.5	7.9	13.8	14.5	24.2	16.9	-1.2
494	0.0	17.9	9.3	8.6	3.1	7.8	6.2	15.9	-8.5	24.5	14.7	17.9	7.1	24.4	10.6	-2.1
495	2.0	14.4	13.7	12.6	4.3	3.4	16.6	14.7	-13.6	21.6	8.1	23.9	13.3	10.4	8.3	3.5
496	4.4	15.8	22.9	20.0	17.3	8.7	19.6	13.2	-0.3	20.9	7.5	4.7	0.5	10.0	14.4	-3.0
497	4.2	20.7	21.8	23.3	13.2	3.3	17.6	1.5	-0.3	1.8	23.6	4.8	2.9	11.3	21.1	1.3
498	-3.4	10.8	6.2	13.0	20.2	22.0	5.1	16.1	-8.7	9.7	11.9	23.6	14.0	16.4	5.7	-4.2
499	3.1	15.6	17.3	24.2	2.6	10.8	16.0	16.6	-1.7	21.6	4.1	3.6	3.2	12.3	17.1	1.6
500	3.2	20.7	12.7	9.9	0.1	17.5	12.8	14.8	-13.9	8.3	3.8	8.8	0.4	24.1	20.8	-4.6
501	-0.6	5.5	14.0	9.2	16.0	14.1	0.3	24.9	-8.8	11.7	6.7	20.9	23.6	10.8	13.3	-3.7
502	3.2	24.4	20.7	19.6	17.2	3.5	3.4	8.0	-8.8	21.6	14.9	18.2	7.4	22.4	18.3	4.3
503	-4.3	9.6	6.2	5.5	24.1	0.1	17.3	22.9	-0.4	15.7	2.8	12.4	1.7	5.2	23.1	3.8
504	-0.3	20.9	10.0	16.5	14.0	4.5	9.3	7.7	-11.0	16.3	23.7	4.9	8.1	9.7	23.0	-1.3
505	-4.0	24.1	19.8	16.9	19.8	9.2	13.0	21.7	-9.3	8.5	21.6	17.0	3.0	21.3	14.0	-2.0
506	0.3	10.2	22.8	19.7	15.5	6.2	22.4	7.1	-10.1	24.6	2.5	24.5	23.6	12.7	7.2	3.8
507	4.3	24.7	24.3	17.6	6.9	7.1	6.8	19.4	-12.2	2.4	1.1	15.4	5.2	19.4	6.4	4.4
508	0.5	12.0	12.8	13.7	11.0	16.6	17.7	17.3	-12.2	11.0	7.0	1.0	16.3	13.8	23.7	4.1
509	-2.7	19.9	21.6	16.5	12.5	11.4	15.1	12.3	-2.3	1.5	2.4	19.7	21.5	7.6	22.4	-0.5
510	3.4	24.5	12.5	10.8	13.7	11.1	5.1	16.0	-12.4	17.8	23.1	8.9	21.7	13.6	17.3	-0.5
511	-4.1	15.4	10.7	9.1	12.4	17.3	18.0	9.4	-14.9	8.3	17.6	12.6	8.3	15.4	10.8	3.8
512	3.4	24.4	9.9	13.9	13.1	25.0	15.7	18.9	-3.9	8.4	1.3	2.5	19.7	23.6	19.7	2.2
513	0.7	13.4	8.5	24.4	10.9	16.3	22.2	8.4	-7.2	11.7	13.7	10.2	0.3	14.1	24.0	3.7
514	-1.9	12.9	9.3	21.8	7.6	21.4	10.8	17.1	-14.3	2.5	15.2	0.6	2.5	10.7	23.7	4.7
515	-2.7	18.2	23.8	23.3	24.9	9.4	11.5	14.9	-8.3	22.5	21.5	20.7	23.0	17.6	20.9	2.0
516	-3.6	22.3	9.4	22.6	5.5	23.7	17.0	19.9	-10.8	7.1	15.7	14.5	11.0	13.6	23.7	-0.9
517	3.0	24.6	20.6	11.5	14.9	23.1	21.5	22.3	-3.6	18.0	20.9	11.9	0.5	18.3	22.6	3.3
518	2.9	12.8	18.9	22.5	23.8	17.7	19.6	20.2	-9.8	9.2	8.1	9.1	4.5	14.7	16.2	-2.1
519	0.2	17.1	6.1	9.2	7.7	15.0	21.5	16.2	-9.2	10.0	5.9	3.1	18.2	20.4	20.8	2.7
520	1.5	0.1	23.6	10.0	10.6	5.6	10.1	19.9	-12.1	24.3	23.3	13.9	8.5	19.5	8.7	-2.8
521	-2.4	18.2	21.0	9.3	21.6	12.3	10.6	7.0	-11.3	14.0	19.2	19.3	24.7	17.1	8.7	-3.6
522	3.0	15.2	20.1	22.3	23.3	11.1	9.2	12.7	-8.9	21.3	24.2	9.2	12.2	8.6	15.3	3.7
523	1.2	7.2	5.8	23.7	6.9	9.3	20.7	18.8	-8.7	20.2	18.5	6.8	14.9	18.8	19.7	-2.6
524	-0.2	14.8	8.0	22.6	14.9	21.6	10.2	7.8	-14.0	8.6	24.0	19.7	6.8	8.3	8.5	4.1
525	-0.6	9.3	15.3	23.1	8.0	11.1	8.8	16.9	-3.8	23.0	7.2	22.7	23.2	19.0	10.6	-0.5

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
526	2.7	16.0	14.2	22.6	20.3	11.0	12.7	13.8	-3.4	21.3	14.3	17.1	21.3	17.7	7.6	-0.1
527	4.9	21.9	21.7	10.0	19.0	19.2	16.0	23.5	-11.4	6.8	22.8	23.6	7.9	8.4	6.1	-4.8
528	2.2	14.5	14.0	11.7	24.8	20.7	17.9	13.9	-7.3	20.1	22.6	13.0	22.3	11.0	21.6	3.9
529	-2.4	21.2	8.7	8.8	8.9	19.5	10.0	21.7	-1.5	16.0	16.6	24.0	6.4	17.6	20.5	3.3
530	-2.2	17.6	11.2	12.8	20.2	13.3	12.5	5.4	-14.4	10.9	18.8	18.8	13.2	9.2	19.9	4.5
531	-3.1	18.0	17.5	12.2	24.0	5.0	17.1	20.0	-7.5	12.8	13.9	15.0	20.6	7.1	23.6	2.4
532	4.9	16.3	7.4	23.9	14.2	13.9	7.9	23.9	-0.3	22.1	12.8	19.8	17.7	16.5	14.3	0.9
533	-5.0	17.8	24.6	16.7	22.0	5.2	5.1	18.0	-10.4	13.4	17.8	24.9	22.6	9.7	24.6	-1.1
534	3.1	13.6	23.5	23.1	9.2	8.6	19.5	9.3	-13.5	19.7	11.7	21.9	22.8	14.9	13.9	-3.1
535	3.3	13.7	11.4	23.3	7.5	10.7	10.7	20.7	-5.7	13.8	16.8	22.3	7.0	17.2	7.9	-0.7
536	1.7	9.3	24.7	22.2	23.7	12.5	9.4	7.7	-7.6	8.3	15.0	16.1	20.3	19.5	15.2	-2.3
537	3.9	14.1	20.2	20.2	20.9	9.7	9.6	14.6	-10.4	16.1	6.5	21.6	17.2	7.5	12.8	0.7
538	-1.9	12.2	16.3	15.9	13.8	9.9	18.5	25.0	-6.7	8.4	17.4	13.9	16.5	14.1	9.5	-1.3
539	-1.4	19.1	18.1	7.4	14.6	9.3	7.1	22.1	-14.3	14.2	20.2	13.3	6.2	12.7	16.4	2.8
540	-3.4	24.3	18.1	8.9	20.6	17.9	19.7	20.8	-14.0	9.8	13.4	19.9	21.0	16.7	24.2	2.3
541	2.3	8.8	24.1	16.3	21.0	18.6	10.8	11.9	-10.5	18.1	24.7	15.8	24.6	19.9	12.2	-1.4
542	-0.6	21.7	10.7	18.3	14.0	8.2	17.9	8.0	-4.2	18.8	20.1	19.4	14.7	7.1	17.8	0.6
543	4.5	6.3	11.9	16.8	21.7	14.0	7.0	7.5	-5.5	9.5	5.8	9.5	8.0	13.8	22.0	-0.8
544	2.5	10.7	18.1	21.8	13.9	17.6	20.1	22.1	-6.5	11.3	6.7	8.8	21.7	7.6	16.9	4.2
545	1.2	12.1	23.7	20.1	17.5	6.8	24.9	22.7	-5.8	22.7	8.8	16.4	10.7	6.0	6.1	-4.7
546	-1.8	8.5	16.0	23.6	6.4	12.9	16.7	23.2	-5.2	20.3	10.1	6.0	10.4	14.8	22.9	-2.6
547	-2.0	24.9	13.8	15.7	23.4	17.4	18.2	5.3	-9.7	5.4	13.4	20.0	18.6	19.9	15.1	-4.5
548	4.3	19.1	8.2	17.5	8.0	9.0	14.8	13.8	-1.4	5.4	7.9	13.0	16.5	18.6	21.1	-3.7
549	-2.3	14.3	21.5	14.9	8.5	11.8	18.8	8.6	-8.5	18.6	16.7	22.5	13.7	13.7	13.1	3.7
550	-3.1	14.4	24.6	13.8	17.9	12.1	9.0	8.0	-0.1	14.4	24.6	14.3	9.7	19.2	7.5	-5.0
551	-2.4	7.4	20.2	16.1	20.3	6.6	7.6	9.1	-14.4	22.6	12.7	19.9	11.6	21.8	24.6	-3.0
552	1.1	17.7	8.9	16.8	13.7	18.4	9.1	5.2	-3.9	9.5	18.6	21.0	9.1	17.0	21.8	-3.5
553	-2.9	7.0	20.8	9.8	19.7	6.3	8.9	10.0	-10.4	8.6	18.7	13.7	23.1	11.3	24.7	4.3
554	-4.1	18.8	13.3	21.0	24.6	24.4	13.8	19.9	-14.9	15.6	18.1	24.6	17.8	18.0	23.8	0.0
555	-3.7	15.2	21.0	19.3	8.2	20.1	17.6	11.7	-8.2	22.6	16.3	10.8	8.4	16.0	8.8	1.7
556	-2.0	12.6	8.4	7.7	6.7	13.8	6.0	11.0	-1.1	20.9	12.2	21.5	21.4	8.0	14.3	-1.9
557	-3.3	15.9	14.8	20.1	11.2	17.9	12.0	24.7	-0.8	23.3	10.3	8.8	25.0	6.0	19.4	-0.8
558	2.7	15.5	11.4	18.6	5.7	14.7	23.6	17.6	-0.4	7.0	9.0	6.4	19.9	14.4	21.4	1.9
559	-0.3	19.0	8.5	24.5	5.7	9.4	12.3	10.0	-6.0	10.4	15.2	6.4	17.4	7.4	24.7	3.3
560	-1.0	8.4	17.1	16.4	8.3	22.2	6.0	14.5	-8.3	19.8	5.6	13.4	22.6	21.9	21.9	0.2
561	0.5	5.7	20.7	17.9	6.5	18.3	10.6	22.6	-13.4	23.9	15.4	14.9	19.1	18.9	10.9	-2.4
562	-2.8	13.2	19.2	21.7	14.9	5.0	11.7	18.0	-5.2	9.8	17.2	23.1	11.2	21.1	20.0	-0.1
563	-1.3	20.6	14.9	11.5	5.5	5.9	13.6	18.9	-13.7	21.8	19.4	23.1	12.2	7.6	15.2	-3.9
564	0.4	13.3	14.9	23.8	22.2	11.7	9.4	10.8	-8.3	9.7	15.2	20.9	23.0	9.4	8.3	1.0
565	2.3	18.8	18.7	15.5	24.1	13.2	19.0	20.2	-5.1	23.4	21.4	21.7	10.2	11.2	15.1	0.5
566	2.0	16.7	17.2	22.8	7.3	7.1	10.8	11.6	-14.4	21.6	19.2	18.1	17.0	14.2	13.7	2.0
567	-2.9	5.6	8.8	5.4	18.6	14.2	8.2	11.7	-6.6	12.0	10.7	10.3	19.1	15.0	10.7	4.2
568	1.2	15.0	16.4	6.6	19.5	12.7	17.5	17.5	-6.2	24.9	14.6	7.3	20.9	18.4	23.6	4.9
569	-1.1	21.0	6.8	23.8	12.3	22.7	6.4	23.2	-13.4	6.4	13.1	20.9	7.6	10.3	15.8	3.0
570	2.2	15.9	10.7	10.5	9.5	21.7	5.8	22.2	-1.3	19.9	5.2	18.5	20.4	21.4	22.5	-0.9
571	4.4	17.5	9.1	23.0	19.7	18.8	22.4	23.7	-12.2	14.4	14.4	18.4	19.5	6.1	6.4	4.5
572	4.2	16.5	7.9	7.2	7.4	11.8	24.8	23.9	-5.6	8.6	18.4	8.5	13.6	21.2	5.6	3.6
573	0.4	12.1	18.8	5.7	7.9	7.6	12.6	14.1	-9.0	11.4	15.3	23.0	6.3	8.2	18.3	4.4
574	-1.3	6.4	5.2	7.3	9.6	9.0	10.6	14.8	-1.0	22.2	13.1	25.0	13.9	24.1	11.4	-2.5
575	-4.8	23.9	15.5	23.8	21.2	5.8	9.7	5.6	-10.2	13.2	17.2	14.5	11.6	9.5	24.8	4.7
576	3.8	12.6	14.6	11.6	9.3	20.5	8.0	10.0	-14.2	14.7	24.3	19.8	21.8	19.7	24.7	4.5
577	-2.4	19.5	16.7	10.0	18.7	19.3	6.5	18.6	-6.4	16.2	15.7	16.7	5.4	11.4	6.6	4.1
578	3.5	21.6	21.9	24.1	23.6	18.8	8.8	8.6	-15.0	21.7	6.3	24.7	6.2	7.0	22.4	-1.0
579	0.7	21.0	21.3	11.6	7.2	19.4	23.8	21.2	-4.2	16.9	22.1	11.9	9.8	23.8	10.5	4.0
580	-0.7	17.5	7.2	10.3	12.0	5.4	10.7	17.8	-12.3	14.1	13.7	8.2	22.5	23.8	16.7	-3.8
581	-0.6	12.1	14.3	12.7	22.9	7.8	6.5	9.8	-14.8	10.6	6.6	7.6	18.5	18.5	19.7	-3.1
582	-1.4	11.3	21.7	9.4	13.2	12.5	15.7	9.1	-14.2	16.0	9.9	19.1	14.3	14.8	14.8	-0.1
583	4.4	21.4	22.4	18.7	23.3	21.8	8.6	24.5	-4.3	23.3	12.3	13.6	15.7	20.7	8.5	-2.6
584	-0.6	5.7	6.8	18.0	19.5	14.9	5.8	25.0	-6.4	15.5	23.2	10.3	6.5	10.4	21.3	-1.1
585	-2.5	24.6	21.9	7.4	12.8	19.4	9.0	12.4	-10.7	5.2	22.9	21.0	20.0	20.5	10.4	0.7
586	1.1	17.4	6.8	18.3	9.2	24.7	10.4	9.6	-3.7	19.6	5.4	13.4	12.0	16.3	5.9	-5.0
587	-4.6	8.5	23.6	8.0	18.2	7.4	24.8	9.5	-7.1	15.3	7.4	14.0	20.1	9.2	21.8	0.2
588	-4.9	6.4	14.1	5.2	5.3	24.7	22.9	14.2	-10.5	12.6	10.4	18.7	8.5	24.9	20.4	-1.6
589	-0.7	11.2	15.3	15.5	14.3	23.6	19.2	17.0	-14.3	10.6	6.0	14.2	13.1	24.3	13.6	-0.4
590	2.3	6.7	15.2	24.1	9.6	6.6	23.2	16.4	-9.9	23.8	20.0	16.3	6.1	22.7	24.2	-4.5
591	-4.0	5.7	10.7	23.8	9.6	10.9	24.1	13.6	-6.4	22.2	14.8	21.7	12.0	16.1	9.8	0.3
592	-0.2	6.3	9.9	20.7	13.4	17.2	12.1	21.7	-0.1	20.9	24.8	15.7	22.0	8.0	14.3	0.6
593	3.5	19.1	9.4	7.0	8.6	7.4	24.2	12.7	-8.6	7.4	16.3	10.5	13.7	6.0	24.4	3.5
594	-2.6	21.3	19.7	5.6	18.9	24.6	12.0	12.5	-9.5	11.0	16.0	12.9	10.5	6.6	20.6	0.4
595	-3.6	18.9	12.4	22.4	23.2	20.3	23.2	7.2	-6.1	15.0	12.5	5.7	5.5	13.9	17.5	3.7
596	-2.1	18.3	6.2	24.4	15.0	12.9	24.5	14.7	-13.5	9.8	13.8	17.4	8.2	22.6	19.1	4.6
597	-3.4	9.0	6.8	19.2	13.9	11.1	20.0	8.6	-6.7	7.2	9.9	17.9	17.3	10.3	14.6	4.5
598	1.6	11.1	10.1	6.5	21.1	22.1	20.7	17.5	-13.0	10.5	21.8	24.9	18.0	17.7	20.7	-3.6
599	2.2	16.1	24.6	6.6	5.7	7.1	8.0	21.9	-8.0	24.7	17.1	18.0	10.7	14.1	18.8	2.7
600	-1.2	19.6	6.2	8.3	20.6	8.5	20.0	22.5	-2.8	21.6	7.6	12.0	14.3	11.5	17.3	-1.6

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
001	-0.2	21.9	13.7	19.0	7.8	5.7	18.4	5.7	-2.5	7.1	15.9	13.7	10.7	10.1	15.9	-0.7
002	2.4	23.5	24.6	11.6	22.5	13.1	17.5	20.5	-9.2	24.6	14.4	14.5	16.6	18.6	19.1	1.5
003	-1.3	9.7	10.5	10.4	5.9	20.3	19.4	16.4	-9.9	10.8	11.7	16.7	17.8	11.1	9.8	-4.9
004	3.3	10.0	10.9	23.7	15.7	14.1	11.1	12.2	-13.4	9.2	24.2	16.0	9.1	18.1	16.2	1.7
005	-3.5	20.8	9.4	17.5	16.5	15.0	22.6	22.6	-3.1	12.3	9.5	8.2	20.0	18.3	14.5	1.9
006	4.2	11.2	23.9	9.9	23.8	22.1	22.6	23.9	-11.5	24.0	15.0	8.5	23.9	14.0	11.7	3.3
007	1.9	10.4	7.5	25.0	8.7	19.8	22.3	23.8	-14.4	13.2	16.2	18.2	18.8	20.2	8.8	-4.3
008	-2.6	24.7	13.4	20.4	10.4	21.3	20.0	8.6	-1.4	15.5	15.3	9.1	16.8	9.7	10.6	-1.2
009	4.0	10.0	8.7	20.8	18.3	24.6	7.6	9.7	-3.4	6.5	20.9	8.3	19.0	12.2	11.3	4.1
010	2.6	19.4	14.4	21.6	7.6	13.7	10.2	5.2	-13.6	8.4	15.6	24.9	11.4	7.7	22.2	-2.7
011	0.9	19.7	15.4	23.4	16.1	8.9	16.5	19.5	-13.6	18.5	6.8	7.2	16.7	14.3	8.9	-0.6
012	3.3	14.6	22.9	15.9	5.5	19.6	20.5	23.4	-9.4	10.4	19.9	22.0	17.7	24.1	7.8	-3.3
013	3.9	16.2	16.5	13.8	23.4	9.4	8.0	22.9	-2.1	18.1	6.9	9.0	11.2	8.5	18.6	2.4
014	-0.9	20.5	19.4	16.1	23.9	23.6	12.9	11.8	-12.9	8.0	12.5	14.6	22.9	6.6	17.6	3.3
015	2.1	18.3	18.7	8.2	6.9	16.6	22.9	16.3	-10.2	16.0	15.8	17.4	12.5	16.4	10.3	1.5
016	2.6	24.6	21.5	15.9	16.9	9.4	23.0	8.9	-11.8	12.4	19.9	8.5	16.2	13.1	20.5	2.2
017	4.1	21.0	6.0	23.8	14.4	18.4	24.6	11.1	-5.4	8.3	10.0	18.5	15.3	23.2	12.7	3.2
018	-4.5	10.9	11.7	6.2	18.1	10.6	18.3	18.5	-11.2	23.0	5.8	20.0	22.6	24.3	16.2	3.5
019	-1.5	8.7	24.9	17.5	21.0	23.7	15.6	19.7	-9.9	15.0	9.9	6.9	21.0	17.8	10.3	2.6
020	2.6	23.3	14.3	10.7	13.0	12.2	13.7	11.1	-4.6	20.6	5.6	21.6	18.4	7.4	8.7	-0.9
021	0.2	13.3	17.5	20.0	17.8	12.6	10.8	13.2	-8.3	7.2	17.7	11.5	5.1	23.7	13.7	3.8
022	2.6	10.5	13.6	18.5	23.4	18.9	24.6	9.8	-0.4	12.3	6.5	13.6	24.1	16.2	23.6	-4.3
023	1.2	10.2	20.2	14.9	21.0	14.6	22.5	17.7	-9.5	12.4	13.4	10.7	8.8	6.8	13.2	0.5
024	4.4	21.5	6.8	8.3	17.7	10.8	14.3	13.4	-10.5	15.7	23.5	6.6	13.4	7.0	15.5	-0.5
025	-4.5	20.1	22.3	8.3	9.7	13.7	22.8	7.4	-5.1	18.8	10.7	6.0	14.3	13.9	22.3	-3.9
026	-0.4	19.8	20.8	6.8	18.0	6.3	10.6	15.3	-10.5	13.9	7.1	16.3	12.4	14.3	9.6	0.0
027	-2.5	10.0	11.1	20.4	21.6	5.8	12.6	22.9	-7.5	24.8	16.6	21.4	15.8	13.9	15.0	-2.9
028	1.0	21.4	17.8	23.2	16.0	7.4	15.6	7.9	-10.3	18.0	12.9	24.6	19.2	21.5	19.6	1.9
029	3.2	20.1	20.7	19.8	21.5	13.6	9.2	15.8	-4.9	21.2	9.2	8.7	12.9	12.5	19.0	-3.5
030	-3.6	8.8	14.0	19.1	16.3	11.2	24.8	18.1	-2.7	20.5	9.0	17.5	7.8	24.6	11.9	4.6
031	3.6	20.6	9.9	13.0	24.3	18.0	7.7	16.9	-5.6	8.2	11.1	20.6	15.9	10.4	11.7	4.1
032	-3.6	7.5	10.4	11.6	22.6	17.9	12.7	15.7	-3.9	6.8	18.0	14.1	7.9	19.7	18.3	1.1
033	-0.3	21.5	18.4	17.8	13.7	24.7	22.6	11.5	-12.4	14.2	23.8	14.0	20.1	15.4	23.1	-0.9
034	-0.7	5.3	5.4	17.0	21.4	23.8	21.2	20.2	-5.2	12.0	18.8	18.8	7.5	9.0	24.4	1.3
035	-2.5	21.1	9.1	8.4	16.2	14.4	19.2	18.4	-12.8	19.8	12.4	23.2	18.8	11.6	8.1	0.7
036	2.3	20.2	19.5	8.1	8.6	11.7	5.1	21.0	-5.1	7.6	13.7	18.3	17.6	22.3	11.2	0.2
037	-3.5	6.0	14.2	16.1	17.1	6.6	14.4	24.7	-11.2	11.0	17.0	10.6	13.5	21.9	13.1	4.4
038	-3.6	20.7	8.2	22.4	18.2	11.9	14.2	20.9	-12.9	6.7	7.1	12.7	23.7	11.4	17.3	1.8
039	-4.6	21.6	16.7	12.8	11.0	18.8	8.1	9.3	-5.3	12.9	18.0	7.9	23.7	7.2	13.6	4.2
040	0.4	10.7	12.0	6.4	15.7	24.3	16.5	7.1	-11.7	5.5	22.0	12.0	6.7	21.5	9.1	4.4
041	0.0	14.8	12.9	6.3	17.8	15.7	5.2	20.8	-4.6	5.8	17.1	7.9	9.1	21.8	20.8	2.7
042	3.1	5.5	8.5	23.6	9.4	8.1	12.5	8.1	-12.0	12.7	13.6	19.0	17.9	17.3	22.2	3.2
043	0.5	8.8	15.9	24.8	6.7	16.1	17.6	6.4	-0.5	8.8	15.3	9.5	19.5	10.9	6.3	4.3
044	0.5	15.4	11.5	18.1	23.5	11.0	15.4	20.0	-3.3	14.0	6.4	7.7	5.1	13.4	17.3	2.7
045	-0.7	22.8	6.7	17.8	14.3	7.3	22.5	10.2	-0.5	21.6	22.9	21.9	11.3	10.3	24.0	-3.5
046	2.9	6.9	18.1	22.4	14.8	13.2	6.3	10.3	-6.3	9.0	19.3	20.0	20.5	18.5	21.7	0.0
047	1.8	8.7	16.4	11.8	18.7	18.5	10.7	16.1	-6.8	22.7	22.3	13.0	19.5	5.2	23.3	1.7
048	4.2	15.1	11.9	5.2	9.5	7.1	18.1	13.6	-5.0	9.7	18.5	14.6	19.0	11.0	6.0	0.2
049	4.2	11.7	11.1	15.0	24.1	22.3	12.5	24.0	-1.6	21.0	16.8	19.3	11.1	9.4	17.6	0.2
050	0.6	15.4	11.4	20.5	23.3	17.0	17.5	11.1	-2.4	12.8	9.5	23.9	5.2	12.3	12.3	0.6
051	3.6	21.3	17.3	6.9	10.1	21.7	11.7	11.7	-5.8	21.0	24.1	20.9	6.7	19.8	15.3	2.0
052	-0.1	13.7	5.4	12.5	21.4	7.7	8.7	7.1	-8.4	11.9	19.0	24.9	23.0	12.5	10.1	0.6
053	-2.2	13.0	23.4	11.8	22.0	20.3	9.6	14.8	-5.1	21.9	9.8	22.1	12.9	11.5	11.7	3.3
054	3.0	24.2	17.1	9.3	9.2	19.4	21.1	10.1	-3.2	6.9	11.9	7.4	22.9	12.4	15.2	2.2
055	-2.5	22.9	19.0	16.7	7.0	15.0	25.0	11.2	-5.0	12.7	18.9	15.0	20.2	15.0	6.5	-0.5
056	-3.1	19.3	9.6	14.4	17.2	7.7	16.5	6.9	-0.6	17.1	9.1	23.8	19.9	17.1	17.0	2.8
057	1.0	10.3	19.2	16.3	19.3	8.8	18.1	14.8	-5.8	24.5	5.9	17.4	15.9	11.9	7.4	-0.5
058	-3.1	13.3	7.6	24.4	6.8	8.4	23.2	7.8	-6.3	18.0	13.0	14.5	15.1	5.1	23.9	-2.8
059	4.7	7.6	13.1	7.9	21.8	16.6	13.8	18.2	-5.9	12.2	6.6	17.7	20.5	22.6	22.6	-1.0
060	-0.6	5.1	9.7	24.7	12.7	15.0	21.9	8.9	-4.8	11.0	18.1	10.2	16.6	19.3	19.6	-1.7
061	0.5	6.8	18.2	19.2	8.0	24.9	6.3	22.1	-6.3	15.5	6.1	9.5	16.9	13.0	10.1	-3.1
062	-0.2	18.6	19.8	18.1	5.4	21.9	15.0	9.6	-3.2	8.3	5.7	9.2	12.6	8.4	23.1	-4.4
063	-4.3	21.8	11.1	9.5	13.3	19.3	23.5	9.4	-6.2	6.4	10.4	8.7	7.4	6.2	13.7	-4.7
064	-2.8	8.5	12.4	21.3	11.6	19.1	12.6	16.3	-1.3	8.0	22.6	16.8	23.7	8.4	6.9	-2.1
065	0.0	22.1	21.6	14.1	18.3	17.7	19.9	5.1	0.0	21.7	23.3	5.5	10.2	23.9	11.8	3.7
066	1.1	23.6	11.4	9.6	17.3	7.6	15.0	10.0	-3.7	13.9	8.6	7.1	18.6	6.0	14.3	-4.0
067	-4.0	22.7	12.5	6.2	24.1	13.1	12.6	8.7	-9.9	16.6	24.3	13.9	20.3	20.3	19.8	4.5
068	1.2	5.6	18.0	14.8	16.9	7.7	16.6	23.3	-1.5	21.6	19.2	22.1	16.2	24.3	24.5	1.4
069	2.3	16.8	13.5	24.3	16.4	24.0	19.7	14.4	-2.0	20.6	24.0	15.9	24.0	10.9	11.7	-4.0
070	0.3	21.6	16.6	7.5	8.1	7.6	23.1	6.8	-8.2	14.8	23.1	24.9	25.0	23.0	15.8	4.9
071	2.0	15.0	23.8	24.2	5.2	22.2	10.4	7.8	-5.2	13.4	23.8	22.3	18.4	22.0	19.2	0.4
072	-4.1	5.3	17.9	21.8	17.6	21.3	6.2	10.7	-5.3	7.3	6.0	13.1	23.5	17.9	23.6	-0.8
073	3.8	20.8	15.6	24.6	18.4	16.7	9.9	16.5	-7.0	11.0	11.7	21.7	13.6	9.7	24.0	4.7
074	-4.4	9.0	9.0	9.0	23.8	23.1	21.7	8.8	-5.3	8.9	11.3	11.2	19.1	16.5	21.4	1.5
075	0.2	5.2	18.6	6.5	9.3	17.0	13.9	16.7	-0.2	20.6	15.8	18.2	15.1	21.5	13.0	3.5

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
676	-4.5	18.2	23.1	18.8	20.9	19.5	12.6	12.1	-3.9	10.3	6.2	19.7	15.9	7.7	13.6	3.7
677	2.9	7.7	18.1	24.3	8.9	16.9	11.2	19.8	-9.0	9.2	24.8	8.9	5.2	7.5	14.2	4.2
678	-2.9	15.5	14.8	14.8	13.6	11.3	21.6	12.8	-6.8	13.2	14.1	10.9	11.9	19.8	12.8	-1.5
679	-2.3	9.4	14.3	19.3	15.5	11.7	21.5	12.9	-3.0	17.3	23.3	12.2	19.2	11.9	12.2	2.0
680	2.2	8.4	8.6	17.6	15.5	23.8	21.2	17.5	-7.0	5.3	6.6	8.9	5.8	20.0	15.4	-4.0
681	-4.0	20.0	14.9	9.9	24.5	23.9	19.5	14.8	-1.4	5.0	18.6	15.5	6.2	22.3	13.1	4.4
682	0.2	10.4	12.6	15.7	22.2	24.8	24.9	21.7	-3.1	14.5	23.3	23.2	12.1	20.1	8.8	-3.7
683	4.7	11.7	23.9	9.9	6.6	5.4	8.7	22.2	-1.7	13.2	23.5	6.2	23.8	10.9	17.0	4.9
684	-0.1	15.0	17.5	18.9	20.8	11.8	13.8	6.2	-6.2	7.8	13.4	18.0	23.0	15.7	20.2	0.5
685	-2.5	21.7	22.9	12.9	9.3	24.7	7.4	7.7	-5.4	6.8	6.8	11.2	11.2	11.6	16.9	-1.2
686	0.2	23.9	25.0	20.7	23.6	20.7	21.1	16.0	-2.4	15.8	9.1	13.5	8.6	20.5	13.0	-2.6
687	0.5	10.4	23.5	5.1	5.2	7.9	19.3	14.0	-9.0	11.8	11.9	17.7	11.3	20.3	17.6	-3.6
688	-0.1	20.4	14.1	18.6	20.4	24.1	21.2	9.5	-8.4	5.9	24.1	10.9	9.6	12.7	21.6	-0.2
689	-3.1	8.4	22.5	9.9	14.5	8.6	19.3	11.0	-4.5	23.7	18.4	12.9	24.4	20.7	15.5	-2.8
690	-4.9	17.2	5.3	17.5	15.7	22.0	5.8	23.4	-6.8	13.6	24.4	17.7	19.8	23.5	11.8	4.7
691	-1.2	9.5	16.1	15.9	10.6	15.0	7.8	9.5	-1.5	14.6	12.7	16.0	11.1	18.6	10.4	-1.6
692	2.4	21.2	19.9	14.7	20.3	6.6	10.5	8.5	-4.2	21.2	19.5	14.3	6.6	18.9	22.3	-2.4
693	-1.9	18.7	22.6	7.8	11.3	22.0	18.9	19.9	-1.3	7.6	15.0	5.7	23.4	16.3	11.3	-4.2
694	3.2	6.5	11.4	17.5	9.2	7.3	16.4	22.4	-3.5	13.8	8.0	12.8	6.2	13.8	18.3	0.7
695	4.2	9.7	9.9	12.5	9.2	10.8	5.2	12.5	-5.7	18.8	13.6	23.1	19.5	13.0	13.6	0.6
696	-0.3	7.0	20.5	11.4	23.2	11.9	11.9	8.7	-4.4	12.5	20.2	5.2	23.5	7.9	14.5	-4.2
697	4.2	12.5	5.4	7.5	18.1	14.6	10.9	17.6	-5.6	22.9	5.4	16.2	24.3	11.8	24.6	1.2
698	1.7	13.2	9.1	21.9	11.6	7.8	14.0	13.8	-1.4	17.5	23.8	6.9	10.4	20.9	7.1	-4.5
699	-2.4	17.1	23.4	20.6	22.9	5.4	18.6	12.6	-4.7	11.4	15.6	6.7	5.3	18.3	16.8	5.0
700	2.6	24.4	11.1	13.9	6.3	12.7	9.1	16.0	-0.9	11.6	17.0	24.5	9.6	14.7	7.9	1.6
701	-4.5	22.0	15.9	19.2	8.8	13.0	9.9	22.6	-4.0	12.7	18.9	5.5	9.6	20.5	18.2	3.4
702	-3.7	9.1	18.5	12.9	21.5	6.6	9.1	12.3	-5.0	16.0	13.3	9.1	14.6	13.3	7.7	-2.1
703	4.0	22.1	21.9	19.3	11.8	21.7	16.8	15.9	-2.4	6.9	19.6	18.3	23.2	24.8	17.6	-3.3
704	3.5	21.0	7.9	24.9	18.1	12.4	22.0	5.7	-7.8	19.9	21.5	8.1	21.4	6.5	14.3	-3.6
705	2.1	8.7	9.2	10.8	20.3	15.1	24.4	7.4	-0.4	22.7	7.7	11.3	5.9	6.0	21.0	4.4
706	-2.6	6.7	17.1	13.3	6.9	23.0	8.7	25.0	-4.4	24.4	23.3	14.1	21.1	14.1	24.6	-4.2
707	2.2	24.7	9.3	13.9	21.6	21.4	8.5	18.2	0.0	9.4	8.8	11.1	7.5	6.6	15.2	4.8
708	-3.9	7.3	10.7	10.4	13.4	12.4	18.0	7.9	-5.1	9.1	17.7	10.7	11.1	17.4	8.0	-2.0
709	3.0	20.2	23.3	23.0	7.9	22.0	21.2	9.1	-7.1	24.1	18.0	19.3	12.6	23.8	15.9	2.0
710	-2.3	5.1	16.1	16.1	23.4	12.8	20.2	7.8	-4.7	19.3	11.9	11.9	24.6	5.7	13.0	-4.7
711	-0.4	20.9	8.4	9.1	17.9	6.4	15.6	23.6	-7.6	14.7	11.0	21.8	15.0	7.8	18.9	3.9
712	3.4	15.6	20.0	8.0	13.8	7.6	6.7	14.4	-6.5	13.0	9.5	8.0	11.5	20.7	13.1	0.7
713	2.9	14.6	24.9	23.6	12.2	12.3	13.1	18.9	-8.2	8.9	15.3	8.9	24.7	19.7	18.9	1.3
714	-1.1	23.9	13.4	16.1	5.0	7.2	18.4	23.3	-7.2	23.6	9.0	10.7	20.5	21.6	10.9	0.5
715	-1.2	6.3	20.5	12.9	10.6	19.9	9.4	7.6	-3.8	20.0	7.7	20.9	7.9	14.8	10.2	3.5
716	0.2	12.3	8.8	13.4	12.1	8.1	15.9	9.2	-4.3	19.6	10.2	18.0	17.7	22.1	12.7	-3.5
717	3.6	7.2	8.0	16.3	17.7	16.2	14.3	10.5	-9.4	14.7	15.4	25.0	11.4	16.2	23.9	-4.6
718	-2.1	11.6	22.1	10.3	23.4	21.0	19.6	22.2	-6.9	11.5	16.9	24.3	15.4	7.4	22.7	-1.8
719	2.8	5.4	11.0	16.0	18.0	18.0	20.0	17.2	-6.9	19.6	21.8	22.9	8.3	23.5	20.8	-0.6
720	2.6	16.5	12.5	10.3	16.8	21.6	18.4	16.5	-5.3	22.1	23.7	14.3	5.7	5.1	19.0	-4.5
721	-2.6	22.1	5.0	15.6	16.6	6.0	24.4	23.3	-7.9	14.8	16.7	20.5	7.9	21.0	16.4	-4.7
722	4.6	19.5	12.4	18.1	9.6	14.7	16.6	18.5	-6.1	13.9	24.0	7.1	6.1	24.0	21.3	-1.6
723	3.4	20.6	15.4	14.3	13.1	15.8	15.8	16.5	-4.3	8.1	12.5	23.4	14.2	22.5	14.0	4.3
724	3.3	10.8	18.5	18.2	6.2	10.8	18.4	20.9	-1.9	8.2	13.3	9.4	13.2	16.3	22.2	1.9
725	1.1	24.9	22.6	15.2	13.3	6.7	24.6	5.9	-8.3	24.1	21.0	7.3	20.3	12.7	19.1	-1.6
726	-2.9	15.6	7.6	12.9	21.5	6.9	5.7	16.1	-8.2	17.4	22.7	19.2	9.3	17.1	14.0	-4.3
727	-0.6	23.9	20.4	14.6	9.6	5.3	19.5	11.5	-3.5	16.0	20.3	6.7	5.2	6.5	7.5	-2.6
728	-2.9	13.8	8.1	24.3	20.5	17.7	15.3	23.8	-2.4	5.1	6.2	10.1	24.4	5.7	22.6	4.9
729	-0.8	14.3	10.7	17.7	18.4	24.0	24.6	14.4	-7.2	10.1	22.7	20.3	6.3	13.5	7.0	-3.7
730	4.0	9.6	18.9	5.3	7.4	18.6	12.4	24.4	-8.9	17.7	21.4	8.2	14.2	7.8	7.3	-0.6
731	-0.5	19.6	20.0	20.4	21.5	20.4	24.8	20.9	-7.0	20.5	8.7	18.0	7.7	10.3	18.3	1.2
732	3.0	24.9	6.3	20.5	11.7	6.8	8.3	18.5	-2.1	5.4	22.5	10.7	18.1	22.0	20.6	1.9
733	-3.1	12.4	6.7	22.7	17.4	7.8	7.8	22.1	-0.6	11.9	5.1	9.6	22.9	5.8	9.4	1.8
734	-3.5	9.3	17.4	10.6	18.7	22.6	12.4	20.0	-9.3	20.4	12.6	17.7	18.6	13.4	12.4	1.6
735	-1.8	5.4	22.8	24.3	15.2	18.6	8.6	16.2	-7.5	20.0	20.0	15.2	12.4	18.5	12.8	-0.7
736	-3.4	21.7	19.7	24.6	18.0	21.7	13.2	8.2	-3.3	14.5	12.0	17.3	20.9	7.5	21.2	3.5
737	-0.1	21.7	7.4	5.7	16.6	13.9	19.8	25.0	-1.2	6.2	13.6	10.7	20.2	6.5	20.0	3.1
738	-3.8	11.6	24.7	5.6	10.7	23.4	22.4	12.5	-8.5	19.6	5.2	23.9	17.3	16.3	10.8	4.0
739	-2.7	24.9	11.3	6.9	18.1	16.1	21.2	5.9	-3.1	19.8	20.2	14.5	9.7	21.3	20.2	0.5
740	-0.4	9.6	11.4	20.9	8.7	16.1	24.3	14.7	-9.7	13.4	25.0	23.8	11.3	7.3	17.3	-0.1
741	-0.1	21.1	22.6	9.4	17.4	12.7	22.6	12.8	-8.3	17.9	16.2	20.9	17.1	9.8	17.4	3.2
742	-3.1	17.8	17.2	10.9	18.8	13.6	8.2	6.1	-1.6	8.7	8.3	21.9	8.4	11.0	22.5	4.7
743	1.6	20.5	15.2	12.3	10.2	16.5	16.8	20.1	-4.9	16.5	16.2	12.5	16.9	16.2	20.7	-4.6
744	3.4	5.4	11.0	10.6	9.5	24.7	17.7	19.0	-1.0	15.3	18.1	11.3	20.6	20.9	14.1	2.7
745	2.2	15.1	23.2	22.0	6.8	15.0	5.0	16.7	-5.1	24.5	13.7	20.2	7.3	13.3	23.6	-4.7
746	-0.6	10.3	15.3	6.7	14.7	20.3	13.1	11.0	-7.8	20.5	17.4	13.2	10.0	23.3	10.8	-3.6
747	-1.6	17.9	24.0	16.9	6.9	15.6	24.2	10.2	-8.0	24.4	11.2	24.2	11.1	12.5	23.0	0.6
748	0.4	12.6	12.4	9.2	20.4	5.0	23.5	19.5	-3.9	23.9	17.0	22.2	21.9	8.0	20.2	2.3
749	4.2	8.8	16.8	8.2	10.5	9.9	18.8	6.7	-0.7	22.4	21.3	22.6	22.4	12.8	22.4	-0.3
750	-0.3	8.3	14.9	17.0	15.1	6.4	10.6	15.4	-2.3	18.5	14.1	11.5	18.8	6.1	12.5	-4.4

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
751	0.1	22.0	21.5	20.9	9.0	16.3	14.2	15.1	-5.9	22.1	18.1	5.2	15.8	5.9	17.6	3.1
752	1.8	11.0	8.0	9.1	6.1	6.0	18.0	8.8	-5.6	15.0	8.9	9.8	11.8	23.3	11.0	1.4
753	4.2	7.7	18.0	5.7	18.9	23.2	18.4	9.4	-8.2	16.2	6.0	17.9	9.7	18.5	5.5	-3.2
754	1.6	7.4	5.3	23.5	14.8	6.5	10.3	19.6	-2.9	19.4	19.4	13.7	5.8	20.0	17.3	-2.3
755	-2.6	20.2	11.9	12.1	7.7	16.6	12.6	8.0	-0.4	24.6	9.7	21.0	9.0	22.8	8.8	-0.8
756	4.2	8.0	7.8	13.3	10.0	9.2	16.3	15.8	-0.5	24.4	21.0	14.9	13.7	17.9	17.5	0.1
757	3.0	8.6	7.4	11.6	15.8	12.0	13.0	18.9	-5.1	11.5	11.5	7.2	20.1	13.2	19.9	-4.9
758	-2.5	17.0	5.3	8.7	12.4	9.7	17.7	21.9	-3.0	17.5	12.7	8.4	12.6	23.9	18.8	-2.9
759	4.5	19.5	21.4	16.5	10.3	21.9	18.6	8.8	-2.5	18.4	7.5	13.8	19.0	15.2	17.6	-0.8
760	-4.2	13.0	22.4	10.7	18.5	14.5	11.2	22.0	-1.8	11.7	10.3	12.5	14.2	18.3	19.0	-0.4
761	1.1	18.5	19.0	5.2	24.1	18.7	23.9	22.7	-5.3	14.8	15.8	21.6	14.6	21.7	18.6	-4.8
762	-1.3	24.7	21.9	24.2	13.4	20.0	18.5	14.5	-7.9	14.0	12.9	20.1	15.9	15.4	15.9	-1.2
763	4.9	11.1	14.5	13.8	20.4	20.3	17.1	16.8	-6.3	20.3	12.0	17.3	18.0	17.6	5.2	-3.4
764	-3.1	17.3	22.7	19.1	17.7	7.3	21.3	20.0	-7.3	13.6	9.0	20.0	12.3	11.0	8.9	-3.5
765	0.8	17.0	20.3	19.7	8.7	16.0	9.1	13.9	-1.5	23.4	15.0	24.1	23.8	9.4	6.6	-1.8
766	-0.3	18.9	16.5	17.9	13.6	11.4	20.3	13.4	-9.7	24.6	14.9	9.2	9.6	9.1	13.6	-4.4
767	2.2	6.6	17.4	16.4	21.5	14.7	16.6	19.3	-3.0	20.7	12.0	7.2	17.8	16.3	24.4	-2.4
768	-3.0	9.6	12.4	15.6	17.1	21.9	7.2	21.6	-7.4	10.5	8.8	24.0	17.6	16.6	9.1	-1.5
769	0.7	15.7	5.2	6.2	5.3	17.8	6.7	22.7	-6.1	7.0	14.6	23.9	10.0	20.4	14.5	-3.0
770	-1.1	6.8	12.3	13.1	10.2	24.6	5.5	11.7	-9.7	5.1	14.8	23.2	23.1	20.7	7.7	-2.3
771	-2.0	14.7	20.8	12.3	21.7	8.9	17.5	11.2	-1.2	6.6	5.2	21.7	14.2	23.5	9.2	-4.2
772	-0.3	6.2	11.6	15.3	8.9	8.4	10.3	24.2	-5.5	14.5	21.0	7.9	13.3	22.6	13.3	-4.1
773	4.7	12.4	10.5	21.5	10.5	12.9	6.2	19.3	-1.2	13.9	7.0	24.2	14.3	10.6	20.3	-4.8
774	-1.1	11.8	13.0	19.5	15.6	15.0	21.3	19.3	-4.1	18.5	15.6	21.2	13.9	18.4	14.6	-4.4
775	4.5	22.8	15.3	24.6	24.7	22.5	6.5	9.3	-0.1	14.8	11.5	6.8	18.2	24.8	20.0	-4.4
776	-4.4	10.0	9.3	8.0	7.3	21.8	18.0	19.1	-1.6	7.4	10.9	12.1	20.7	24.3	5.9	-4.5
777	4.3	20.8	14.3	18.4	24.5	5.5	9.2	13.6	-7.4	9.7	17.2	24.5	22.5	6.5	8.8	-8.4
778	-2.9	7.8	11.5	14.7	7.4	16.5	22.6	7.4	-0.3	16.0	22.6	22.2	6.8	11.1	8.8	-1.7
779	3.2	23.5	22.7	12.6	6.2	5.6	17.0	9.0	-0.3	11.0	6.5	11.3	17.6	11.4	23.7	-0.6
780	-3.2	15.4	12.1	19.3	23.5	21.0	21.7	11.1	-7.0	20.1	21.0	7.9	10.3	15.5	13.1	-2.2
781	3.8	20.2	23.5	24.8	17.6	24.4	6.6	5.6	-5.6	22.2	7.3	20.0	7.9	21.3	11.4	-0.7
782	-4.4	21.3	17.5	12.5	18.8	9.0	24.8	23.4	-4.7	24.5	13.6	9.5	5.1	5.7	11.9	-4.5
783	2.9	24.9	15.8	23.4	15.0	13.2	23.9	23.3	-9.4	10.0	19.6	17.0	12.1	21.5	12.8	-0.4
784	0.6	16.8	22.5	11.0	24.1	19.0	12.9	5.6	-0.8	20.8	21.0	13.1	5.2	8.5	8.4	-4.5
785	-2.6	6.7	23.6	9.1	21.4	17.1	7.0	11.6	-6.8	23.6	12.5	16.4	8.0	12.8	8.8	-4.9
786	-3.5	16.2	24.2	14.4	10.9	7.8	18.0	21.9	-3.9	23.7	15.0	13.5	20.6	23.8	18.2	-4.9
787	2.0	23.0	5.3	10.9	11.2	12.1	11.3	16.7	-2.7	5.6	17.0	21.6	20.4	19.3	13.6	-2.6
788	1.0	24.4	5.9	5.9	20.6	6.8	17.2	22.1	-9.1	24.7	17.9	12.8	23.0	19.0	6.2	-4.0
789	-3.5	17.7	21.4	19.9	19.5	16.2	9.3	15.8	-0.9	22.1	14.6	19.3	20.0	16.3	23.6	-0.2
790	-4.9	10.7	16.7	5.5	10.8	6.4	20.2	19.1	-3.1	21.0	19.8	5.4	11.1	22.4	8.5	-3.9
791	4.4	22.7	5.4	8.1	5.9	11.1	23.2	18.0	-0.9	24.3	11.5	12.5	12.2	16.3	8.1	-4.0
792	2.2	10.9	18.5	25.0	9.4	24.2	18.8	14.0	-2.0	14.3	18.5	5.2	8.4	24.0	12.8	-1.1
793	-4.5	9.3	17.3	11.0	15.4	24.0	9.0	17.4	-3.9	18.8	7.3	16.4	12.9	7.5	5.1	-2.5
794	-3.0	8.7	23.1	19.7	18.3	11.4	14.0	11.8	-7.8	7.2	13.2	9.2	16.0	15.1	8.4	-1.0
795	2.1	22.7	11.3	10.3	20.5	15.6	23.1	13.1	-8.7	16.3	18.9	21.1	5.0	13.6	12.8	-4.9
796	-4.3	8.8	7.8	22.5	14.1	10.7	24.6	13.6	-1.7	15.2	6.0	23.7	21.6	18.0	17.3	-1.1
797	3.2	9.5	7.1	5.9	16.1	5.2	20.7	10.8	-3.6	17.5	9.3	20.0	15.6	14.0	24.0	-0.7
798	2.2	7.0	9.1	6.3	8.9	15.8	18.9	23.2	-8.3	12.9	10.2	13.2	13.7	10.1	18.2	-1.5
799	-3.8	22.5	7.9	16.1	21.1	7.3	13.3	18.3	-8.8	22.9	8.1	19.4	9.2	19.9	13.7	-3.1
800	3.5	20.6	7.8	14.1	6.3	17.8	21.9	10.5	-2.6	18.8	20.9	15.2	13.7	19.9	18.8	-4.0
801	-4.7	19.5	11.7	13.9	19.4	12.2	5.5	11.8	-9.7	11.7	8.8	15.8	18.2	11.7	11.0	-3.1
802	-0.6	13.6	9.1	21.7	8.1	19.1	22.3	11.8	-7.0	7.7	23.0	18.4	15.0	6.4	13.7	-1.8
803	1.9	11.0	17.8	14.9	20.8	5.4	23.4	16.3	-1.3	20.4	23.7	23.9	10.7	19.3	16.3	-2.5
804	3.8	23.4	9.4	21.9	23.7	14.9	21.4	16.6	-2.6	15.3	14.1	17.2	12.9	7.2	20.3	-0.5
805	0.0	9.6	8.0	12.1	10.6	13.9	24.8	18.6	-2.8	22.4	12.5	5.2	23.1	12.7	15.6	-3.8
806	-2.6	16.8	11.8	8.9	9.0	14.8	18.2	21.7	-3.1	24.8	15.3	6.0	10.0	18.8	15.4	-3.9
807	-4.4	9.0	11.2	9.9	15.4	11.0	8.8	23.3	-2.9	7.5	11.8	20.0	6.1	15.2	6.5	-2.0
808	2.2	10.1	6.5	24.0	18.1	11.1	24.8	17.4	-4.1	11.1	8.3	9.6	14.8	11.5	23.2	-0.9
809	1.6	21.8	17.6	9.0	22.7	8.6	8.5	18.8	-5.1	6.1	20.5	8.4	17.4	17.7	19.5	-1.7
810	3.3	20.8	11.1	25.0	8.9	17.3	7.0	24.5	-2.9	6.1	19.0	17.0	24.1	9.3	5.2	-3.1
811	-2.7	7.7	11.8	12.0	6.2	16.0	13.5	10.9	-0.6	8.9	12.7	5.5	21.3	17.1	12.1	-2.9
812	3.5	16.1	12.4	13.2	10.3	17.2	14.6	11.7	-3.9	15.2	13.5	22.6	14.3	22.1	21.6	-3.1
813	-1.1	14.0	22.6	21.1	18.7	9.5	5.3	23.6	-7.1	21.2	7.3	8.0	9.0	15.2	8.4	-0.9
814	-3.5	12.0	7.5	12.7	19.0	24.7	24.0	16.9	-7.2	6.6	17.4	24.8	13.7	13.5	15.9	-2.2
815	1.8	12.8	23.5	16.8	18.2	15.6	24.0	15.7	-1.7	9.7	8.1	18.2	12.2	16.6	16.8	-0.6
816	4.7	16.0	7.7	10.4	19.9	25.0	6.8	8.9	-9.1	19.4	19.4	20.5	8.4	9.3	18.9	-3.2
817	-3.2	24.6	9.5	12.1	11.0	6.4	6.9	16.4	-1.7	6.0	5.5	24.4	17.4	24.3	15.4	-4.8
818	-3.6	15.8	16.6	21.3	13.3	19.3	5.2	14.5	-4.1	7.0	11.8	21.5	14.1	9.8	7.8	-4.0
819	-3.7	7.8	15.9	22.1	23.0	17.1	8.9	12.0	-9.8	18.6	15.7	7.1	12.3	11.4	12.5	-1.9
820	-4.7	6.2	10.9	17.2	7.8	13.1	6.2	12.8	-4.7	7.5	18.4	7.0	23.0	16.3	17.1	-2.1
821	-1.7	12.6	12.5	19.7	6.4	5.6	21.7	14.5	-4.1	15.7	13.3	21.4	15.1	14.3	13.7	-4.6
822	-4.7	15.6	8.1	24.1	17.7	15.7	18.9	20.3	-5.2	11.1	22.9	10.4	6.0	6.4	23.7	-3.5
823	-4.8	23.5	19.2	19.4	14.0	6.6	23.4	18.4	-0.1	17.1	10.5	6.7	8.2	5.6	7.8	-4.9
824	-2.5	18.5	18.5	18.5	18.5	9.5	13.1	23.0	-9.5	8.2	18.7	24.7	10.2	8.9	17.1	-4.1
825	-2.3	14.6	7.2	13.8	24.5	8.1	6.5	10.0	-3.6	23.7	22.1	10.5	8.7	14.4	9.1	-1.7

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
826	-1.5	22.1	21.0	7.1	7.9	17.3	21.1	23.5	-8.0	18.0	15.6	11.2	21.1	20.6	22.8	-3.2
827	-1.5	23.4	11.9	9.4	12.0	9.7	5.7	16.9	-2.1	5.2	12.0	7.7	11.2	22.8	23.6	-1.3
828	-3.4	8.3	16.6	14.2	21.8	17.9	23.4	12.7	-2.0	17.0	11.8	12.8	7.4	14.0	8.9	-2.0
829	-0.5	21.0	20.3	23.7	20.4	15.0	6.3	10.5	-9.2	17.2	21.7	16.8	17.2	9.6	24.9	-2.9
830	-1.1	13.1	11.8	16.2	15.7	14.0	12.6	23.4	-2.3	10.3	6.6	5.6	9.1	22.7	9.5	-3.8
831	-4.2	21.9	20.8	15.7	17.9	19.6	14.3	8.9	-2.7	17.2	6.6	22.9	13.7	20.8	18.0	-0.8
832	-3.5	8.8	22.0	19.8	24.3	17.9	10.8	8.7	-7.0	5.5	9.0	15.5	21.9	11.8	18.4	-4.2
833	-1.0	15.5	10.4	10.8	10.2	17.3	9.1	7.3	-1.7	8.5	14.6	6.1	6.7	19.6	17.6	-2.8
834	-4.5	17.4	14.9	14.3	22.7	5.2	16.1	20.0	-7.0	17.6	19.0	23.3	19.6	7.3	6.2	-0.9
835	-4.7	20.2	24.0	21.4	13.0	5.6	9.0	9.7	-8.5	16.4	7.7	11.0	14.9	14.1	18.6	-1.6
836	-3.0	8.3	7.2	21.9	23.8	15.2	16.9	14.7	-7.8	14.7	7.9	24.0	8.7	23.1	13.8	-0.1
837	-2.3	15.2	21.6	21.7	17.6	16.9	18.2	19.7	-7.3	17.1	7.6	6.7	18.8	21.8	21.0	-1.1
838	-2.6	21.7	6.1	7.7	5.4	23.8	23.3	18.4	-1.0	11.4	7.9	13.9	23.4	7.1	19.7	-1.8
839	-2.4	13.7	12.5	20.1	9.3	15.3	18.4	23.7	-3.6	6.8	9.8	15.3	5.9	19.1	21.3	-0.2
840	-2.0	15.4	18.2	21.1	8.6	23.2	6.4	23.1	-6.9	24.8	13.3	21.2	18.4	13.2	24.1	-0.9
841	-2.4	13.3	12.4	8.5	6.3	19.1	9.9	14.7	-2.7	16.2	23.6	22.3	24.1	19.4	5.2	-4.3
842	-3.9	21.1	11.7	17.2	11.6	12.9	6.3	19.5	-3.4	13.0	5.1	10.6	20.5	6.9	8.6	-4.7
843	-2.8	6.1	24.1	12.5	9.4	8.3	17.4	23.6	-2.8	22.8	8.3	16.8	17.1	17.9	7.1	-3.3
844	-3.0	20.4	12.1	8.3	21.2	17.8	23.2	14.9	-6.1	12.4	23.4	20.5	12.5	15.3	10.9	-2.6
845	-2.7	17.0	22.6	7.6	23.2	19.0	14.4	15.5	-4.2	9.6	16.4	16.2	25.0	7.8	11.1	-0.1
846	-2.9	14.6	22.5	23.4	10.8	7.5	19.3	8.9	-7.9	24.9	11.9	16.4	15.5	5.4	22.5	-2.9
847	-4.3	19.7	9.6	24.0	12.1	7.5	13.8	18.6	-8.6	13.8	10.9	16.0	21.1	20.6	23.3	-3.7
848	-2.8	23.3	14.5	22.5	14.4	16.9	11.7	6.9	-9.2	22.5	5.8	15.0	6.8	20.0	20.6	-4.4
849	-2.5	16.7	8.0	17.9	21.0	13.9	24.7	12.6	-0.8	10.7	17.4	8.7	5.5	8.0	21.0	-2.3
850	-3.7	6.9	6.6	14.2	11.6	5.4	14.3	18.6	-8.5	21.6	15.7	9.2	6.1	9.9	5.7	-2.8
851	-0.6	20.0	5.7	8.0	12.0	15.7	14.1	18.2	-4.5	5.2	14.4	14.5	14.2	14.3	23.7	-0.8
852	-3.5	21.1	17.0	12.4	18.7	7.8	19.9	6.3	-2.7	20.2	18.2	7.2	13.9	16.8	8.6	-1.8
853	-0.7	16.2	8.0	19.0	21.5	5.3	24.5	16.3	-3.0	14.0	6.8	19.4	12.7	17.5	9.6	-4.6
854	-1.1	14.1	17.1	7.0	20.7	22.5	18.6	15.8	-7.3	5.5	20.3	16.9	10.4	15.9	7.8	-0.4
855	-5.0	21.8	15.6	24.5	8.4	11.3	5.9	7.5	-5.1	24.6	5.5	5.4	12.9	14.5	11.6	-4.3
856	-3.7	11.7	21.1	22.2	12.5	22.2	24.5	19.4	-0.5	21.7	9.4	9.1	11.8	24.1	24.7	-3.4
857	-0.8	9.8	20.4	20.3	10.9	19.7	14.4	11.9	-9.8	18.8	12.1	11.9	12.3	14.8	14.9	-0.5
858	-2.5	9.9	5.3	6.2	12.3	17.1	18.7	15.9	-6.3	20.9	10.1	11.7	18.7	8.3	11.2	-2.1
859	-2.9	20.6	24.7	22.2	16.6	14.7	8.5	21.4	-9.6	11.0	13.4	7.5	10.3	24.2	9.3	-2.3
860	-4.9	8.6	15.6	7.8	14.2	7.2	18.2	9.8	-1.0	7.3	15.6	18.6	13.7	10.2	9.3	-2.6
861	-0.1	6.0	10.8	18.6	11.3	14.5	16.6	12.6	-5.2	8.1	6.5	14.4	14.8	5.5	24.8	-2.6
862	-1.6	23.4	11.1	20.9	15.4	15.8	20.8	12.4	-0.7	23.6	12.6	9.4	16.0	23.8	7.0	-2.1
863	-0.2	20.2	18.1	14.2	16.7	5.5	7.8	24.3	-8.3	24.2	6.8	21.0	18.5	14.7	20.5	-2.5
864	-1.2	14.1	12.3	6.3	20.9	21.7	22.0	24.7	-9.8	6.9	13.1	13.7	18.5	19.0	13.1	-4.3
865	-3.2	7.6	6.8	20.5	5.3	15.0	17.4	22.7	-4.8	8.9	15.7	18.8	21.1	11.5	19.4	-0.9
866	-4.8	8.9	17.0	19.5	6.0	24.2	12.8	16.5	-5.4	24.6	7.6	22.4	24.0	19.9	17.9	-2.1
867	-2.7	18.2	9.1	7.4	22.5	23.0	10.9	15.0	-1.6	8.9	17.6	23.3	14.1	21.1	18.5	-3.2
868	-1.6	24.8	15.1	11.1	23.3	17.3	8.4	14.4	-6.4	7.7	14.5	9.0	21.9	24.6	7.2	-2.9
869	-1.7	19.5	10.2	17.4	16.2	7.2	18.2	16.0	-4.8	12.6	10.7	5.8	17.4	23.3	8.7	-3.9
870	-4.0	5.7	19.2	21.1	21.8	10.0	15.6	19.4	-0.1	5.7	17.0	13.5	7.3	7.9	16.4	-2.0
871	-3.8	21.0	24.7	23.6	15.6	6.4	6.2	10.2	-5.2	18.9	22.8	19.6	5.3	8.1	10.6	-3.3
872	-4.1	14.9	22.0	21.9	18.8	16.0	12.2	16.2	-1.1	11.5	14.1	20.7	24.2	8.7	23.7	-3.8
873	-2.2	11.0	10.4	9.9	17.2	6.9	8.5	7.8	-8.4	11.3	17.7	7.5	12.1	5.9	21.3	-3.8
874	-3.7	14.3	16.1	19.5	24.7	6.6	6.0	21.6	-9.4	16.8	11.4	16.1	23.8	22.8	20.9	-2.7
875	-3.7	21.0	16.7	13.8	5.7	23.2	15.9	10.5	-3.4	18.6	24.4	21.4	21.6	6.9	16.6	-0.7
876	-0.2	21.6	21.3	7.5	10.8	11.7	21.9	18.0	-1.7	8.4	17.8	19.2	6.0	20.6	20.0	-4.1
877	-1.8	13.8	19.8	12.8	11.3	16.9	19.0	24.0	-6.3	18.5	7.6	20.8	7.0	10.7	10.6	-3.2
878	-3.8	20.3	17.3	17.8	18.5	9.3	15.4	18.4	-4.7	14.4	20.2	19.3	16.0	15.7	13.1	-2.8
879	-0.5	23.0	11.2	7.6	5.2	17.1	17.4	16.7	-9.5	18.6	7.1	8.2	19.2	5.4	8.7	-0.6
880	-2.0	11.0	18.5	23.2	19.9	14.4	22.9	14.6	-4.1	22.8	20.7	18.6	7.4	7.8	19.6	-2.9
881	-4.9	7.2	16.8	16.7	23.9	15.5	6.4	24.9	-4.7	10.4	8.1	15.9	22.7	16.3	7.9	-2.8
882	-0.1	18.5	22.8	18.0	6.6	11.7	17.0	18.8	-3.1	24.0	17.2	18.3	24.1	15.4	12.0	-4.2
883	-0.5	18.7	13.8	17.4	13.4	24.5	23.1	8.0	-3.8	24.1	18.1	7.3	11.2	9.4	5.5	-2.5
884	-3.5	9.6	6.4	5.7	12.8	6.5	12.9	19.3	-4.2	12.5	7.8	21.2	18.0	15.2	17.7	-0.6
885	-4.8	9.0	21.2	17.5	19.2	13.6	21.7	22.6	-9.5	24.9	16.9	24.7	14.1	11.5	22.8	-0.5
886	-0.1	20.7	11.0	10.8	6.5	5.7	7.4	16.0	-5.5	21.6	11.6	16.8	13.7	17.5	6.2	-4.5
887	-2.6	9.6	20.4	7.3	24.3	5.1	8.7	16.7	-9.0	12.4	14.5	9.0	10.4	19.8	11.8	-4.2
888	-1.7	19.5	19.8	8.4	18.2	17.1	22.9	5.5	-2.9	13.1	18.1	8.5	15.6	5.4	5.7	-2.7
889	-4.0	21.9	22.2	14.6	9.3	16.7	15.6	21.7	-6.4	17.0	15.3	16.0	17.6	12.7	13.7	-0.2
890	-4.1	10.0	20.8	7.1	6.9	11.6	13.0	13.8	-3.9	13.7	24.2	11.0	19.7	15.5	18.1	-2.1
891	-0.2	20.5	12.1	11.6	24.0	17.1	22.8	7.6	-4.2	5.5	17.0	18.9	19.9	13.5	23.8	-4.5
892	-3.8	11.2	6.4	10.3	21.2	20.6	7.5	5.9	-7.6	14.2	12.4	15.5	13.2	11.2	24.8	-4.6
893	-0.1	6.0	6.1	5.9	11.6	18.0	24.4	5.7	-5.4	13.1	13.5	11.7	6.6	23.2	13.1	-2.6
894	-4.9	9.0	5.6	8.1	10.8	12.8	13.3	16.9	-3.3	14.5	12.2	6.7	8.0	19.4	16.7	-1.5
895	-2.7	21.5	7.7	15.6	19.6	16.7	23.6	22.3	-0.6	18.3	14.8	17.6	5.3	20.6	16.1	-0.2
896	-1.6	21.7	23.7	11.8	15.7	22.0	12.3	12.1	-5.6	11.1	23.3	13.6	10.9	7.9	16.8	-0.6
897	-3.7	14.2	16.6	18.3	5.6	9.7	8.0	18.9	-2.3	11.9	20.3	10.3	6.3	16.8	10.9	-0.3
898	-1.9	20.5	12.5	19.2	6.6	13.6	19.5	14.7	-2.3	11.0	13.1	11.8	22.5	16.6	9.1	-1.0
899	-0.3	18.6	23.7	11.8	13.1	11.2	19.4	19.2	-2.9	22.8	24.1	10.2	12.4	21.8	14.0	-3.1
900	-3.7	16.8	19.7	22.4	18.7	6.8	11.0	14.3	-1.5	22.5	17.8	6.4	24.5	5.7	22.6	-3.7

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
901	-4.8	13.0	11.7	11.3	13.0	8.0	6.6	9.1	-8.5	16.2	17.3	7.0	14.6	12.9	14.5	-2.5
902	-2.6	15.6	22.2	23.0	14.0	7.2	24.3	18.4	-6.2	21.1	19.2	21.2	22.6	19.4	9.5	-1.3
903	-2.7	14.5	21.9	24.8	14.2	16.9	16.1	21.0	-1.1	10.6	17.0	18.0	11.1	24.1	16.9	-3.7
904	-4.1	23.4	22.7	5.8	6.1	13.9	17.8	20.0	-3.8	23.2	24.4	12.9	9.8	15.2	16.4	-1.3
905	-4.9	15.7	18.0	13.5	11.8	12.3	5.1	24.2	-0.4	10.6	17.7	22.1	12.2	15.5	20.8	-2.1
906	-0.1	21.7	15.7	6.5	6.4	15.7	24.8	12.2	-3.1	24.8	5.5	14.5	12.3	7.1	13.9	-1.6
907	-3.4	15.7	23.8	19.8	7.4	9.5	14.2	7.6	-0.1	14.0	12.9	23.8	25.0	16.7	14.3	-1.3
908	-4.3	13.6	19.4	9.3	17.2	12.8	24.8	16.2	-7.2	12.6	14.4	12.1	7.1	12.1	19.9	-2.0
909	-3.6	23.0	7.0	23.9	13.8	17.3	17.5	5.5	-3.2	12.7	17.9	5.3	12.7	23.4	9.0	-4.6
910	-4.6	17.6	16.8	23.9	16.5	22.9	5.4	14.4	-5.3	22.2	13.2	20.1	16.5	11.7	17.7	-0.6
911	-3.2	13.7	13.9	17.9	8.7	17.4	24.9	15.9	-9.6	22.2	23.1	16.5	14.5	22.3	12.4	-3.3
912	-3.9	16.0	9.2	10.0	10.2	19.3	14.1	16.3	-3.9	7.4	23.2	7.4	5.2	15.1	12.4	-0.5
913	-0.8	5.7	7.4	22.0	20.9	12.2	9.0	16.0	-8.8	16.9	18.2	13.3	14.7	10.7	17.7	-1.6
914	-2.7	22.1	19.4	13.4	6.4	17.2	21.7	6.9	-6.2	14.4	19.7	20.6	12.5	15.3	6.8	-3.0
915	-3.8	17.5	9.2	8.0	6.9	9.0	11.4	15.8	-8.2	19.3	22.2	10.3	20.8	14.2	20.0	-4.8
916	-1.4	9.8	6.6	10.9	14.1	5.9	7.4	22.4	-3.4	21.6	11.6	11.4	11.8	22.0	13.4	-2.2
917	-1.0	10.6	11.8	11.5	6.5	13.2	14.5	22.1	-1.1	5.1	13.6	11.7	21.1	12.6	10.0	-0.5
918	-1.3	17.4	24.6	16.2	15.2	5.7	15.7	11.2	-4.2	14.0	24.1	8.8	18.9	6.1	6.7	-1.1
919	-3.1	19.6	16.2	22.9	24.2	13.5	6.6	14.4	-9.0	9.2	19.1	16.8	19.9	20.0	19.2	-1.1
920	-1.4	7.6	16.8	18.4	19.9	20.6	9.8	18.3	-4.2	22.4	5.9	5.6	22.9	14.2	7.5	-2.8
921	-4.8	13.1	21.4	5.5	9.6	17.0	22.3	15.4	-1.6	21.1	10.2	16.1	13.0	24.1	7.4	-2.4
922	-0.9	11.5	19.2	14.3	8.1	8.9	11.1	9.3	-9.7	21.1	11.5	21.4	17.1	16.9	6.7	-0.8
923	-3.9	5.4	21.8	21.3	10.6	10.6	9.5	8.7	-9.3	10.1	6.1	14.5	7.8	19.6	13.2	-3.1
924	-4.8	6.6	22.1	11.9	11.8	12.5	12.6	16.0	-3.0	14.7	11.2	17.2	6.2	17.9	9.0	-1.9
925	-2.4	22.0	9.7	22.4	17.4	20.2	19.5	11.2	-9.6	16.5	17.0	12.7	15.7	17.9	6.3	-2.1
926	-1.4	19.5	22.6	13.0	21.1	14.7	20.2	7.3	-0.2	12.6	21.8	18.5	13.3	13.5	6.3	-0.3
927	-4.5	17.3	7.0	7.8	13.3	17.4	6.6	5.4	-0.6	13.8	7.6	12.4	8.1	22.3	11.9	-4.4
928	-2.9	7.4	10.8	7.4	18.0	21.0	12.5	23.6	-7.4	12.5	24.5	21.9	7.4	14.9	11.0	-0.7
929	-1.8	20.4	15.3	8.9	13.3	12.3	13.0	8.0	-8.2	24.5	23.6	24.1	19.5	16.3	6.6	-2.9
930	-2.7	5.3	22.6	9.4	8.5	7.8	9.4	21.9	-0.9	23.4	20.9	11.3	8.9	24.2	18.6	-1.8
931	-3.3	11.8	17.6	23.3	10.3	16.3	6.5	15.5	-1.3	5.9	7.5	10.3	23.7	21.0	15.6	-4.0
932	-3.6	21.2	14.5	22.5	7.9	24.1	16.9	23.4	-8.4	5.9	21.7	11.8	17.3	6.2	6.9	-1.5
933	-5.0	12.7	17.2	24.6	14.5	23.1	19.2	11.7	-9.2	6.2	7.2	8.4	12.3	13.1	21.4	-2.4
934	-2.4	21.0	15.4	23.8	6.0	19.6	5.3	11.5	-4.7	23.0	19.1	16.1	20.3	24.4	10.3	-3.9
935	-4.1	9.5	8.5	24.8	15.9	12.1	13.2	9.5	-5.9	15.1	10.1	20.6	20.7	7.0	6.1	-3.2
936	-0.7	20.7	6.6	5.7	21.8	19.6	21.2	13.9	-1.6	6.2	20.1	18.3	6.2	8.4	17.2	-3.6
937	-2.3	13.4	16.9	24.9	8.8	6.5	21.4	22.2	-6.0	20.3	24.6	23.9	16.9	15.5	8.4	-4.9
938	-4.0	5.6	10.5	16.6	19.7	24.7	8.6	23.4	-4.3	16.6	7.6	11.0	5.1	16.5	13.5	-3.7
939	-1.7	5.7	16.0	11.5	22.1	20.9	13.4	6.1	-8.1	17.2	23.6	11.8	18.9	11.9	14.0	-0.3
940	-2.6	5.7	20.3	14.7	10.1	9.1	13.5	20.9	-3.2	18.3	8.1	22.7	14.1	21.1	20.1	-1.3
941	-0.5	11.6	18.9	12.4	14.1	17.5	16.5	5.3	-0.4	16.9	22.1	8.9	13.7	9.7	6.3	-4.0
942	-3.2	21.7	8.0	15.7	10.2	23.5	8.0	14.3	-5.3	24.1	9.4	7.3	21.6	5.8	20.8	-2.6
943	-1.6	13.0	7.4	23.0	14.2	17.3	22.3	17.0	-6.9	12.7	18.2	16.2	17.7	24.3	23.1	-1.2
944	-3.3	17.6	20.3	12.8	12.0	5.6	13.3	24.4	-3.7	22.4	15.7	8.2	21.7	15.1	19.2	-4.9
945	-2.6	5.1	24.0	10.9	23.2	18.9	12.9	24.7	-9.3	23.7	12.6	16.6	16.5	9.9	24.2	-2.5
946	-0.5	14.6	21.5	10.0	18.4	18.9	8.7	22.4	-6.8	9.6	6.7	21.0	7.2	11.5	9.8	-1.6
947	-3.8	19.5	7.5	8.6	21.0	7.4	12.6	16.3	-1.4	9.7	22.7	17.1	23.5	16.1	15.9	-0.2
948	-1.4	22.4	13.9	14.5	11.3	23.3	15.0	22.3	-1.2	20.0	17.4	20.1	10.6	7.2	8.6	-0.5
949	-4.8	10.7	7.3	9.0	14.2	8.2	23.5	24.2	-8.9	13.3	21.2	18.3	9.5	12.9	6.5	-4.2
950	-5.0	22.4	11.8	20.8	7.0	20.8	11.8	18.6	-7.0	17.6	16.6	16.5	5.4	8.8	14.8	-1.5
951	-4.4	15.6	19.8	12.5	22.4	7.0	9.9	8.4	-9.5	22.8	8.6	24.8	5.5	18.3	5.8	-5.0
952	-2.7	24.4	11.8	18.4	17.0	24.1	22.3	24.9	-1.5	19.1	8.2	12.3	16.3	24.4	10.4	-2.8
953	-1.5	17.3	16.5	7.8	19.1	7.0	9.1	24.0	-1.6	22.1	11.6	11.6	11.6	5.8	6.1	-1.2
954	-4.2	15.9	10.4	23.7	5.6	8.2	23.0	15.9	-9.8	12.3	13.3	23.7	12.9	20.7	13.1	-1.8
955	-0.4	19.4	15.6	9.5	8.7	15.8	6.8	5.7	-9.1	20.7	6.9	6.8	8.2	16.9	21.3	-2.7
956	-0.2	19.1	24.9	9.7	6.7	13.3	12.2	23.2	-1.4	13.5	6.6	24.0	14.4	8.6	11.2	-2.8
957	-0.2	16.3	6.5	19.7	20.9	10.4	16.5	21.9	-6.4	15.3	5.3	15.9	22.2	6.5	18.6	-2.3
958	-0.7	19.2	8.3	13.5	15.6	10.0	21.7	9.8	-6.2	22.4	7.3	23.1	21.4	10.8	18.6	-5.0
959	-1.2	24.3	6.1	20.1	24.4	20.4	15.9	9.8	-8.0	23.9	21.2	20.6	23.7	20.3	12.2	-2.6
960	-2.3	16.0	11.6	9.6	19.9	20.9	10.0	22.7	-0.3	5.7	24.6	23.5	7.7	19.5	18.7	-4.5
961	-4.5	13.7	12.6	6.1	10.9	9.6	11.4	16.7	-5.0	9.1	16.7	24.6	20.6	20.0	6.0	-1.6
962	-2.2	7.3	13.4	11.6	18.7	6.0	8.2	15.6	-4.1	24.5	8.7	5.6	20.8	10.1	15.2	-1.6
963	-3.1	9.5	18.2	9.1	10.1	20.9	17.0	20.2	-6.2	7.6	5.1	15.4	6.5	24.8	18.7	-3.6
964	-0.2	18.5	18.5	9.4	21.0	12.7	23.0	20.0	-4.8	7.0	24.8	21.5	21.5	10.0	15.8	-2.1
965	-3.0	13.6	13.5	20.1	15.1	9.5	6.5	12.3	-9.5	15.1	19.3	22.4	9.5	19.9	7.5	-4.5
966	-3.8	22.3	19.0	12.7	12.6	22.9	5.3	11.6	-2.1	16.1	9.0	16.6	6.6	12.4	23.2	-2.6
967	-3.1	7.9	6.5	10.3	10.6	10.7	12.9	15.6	-0.7	5.9	8.1	16.4	15.3	5.9	21.0	-1.3
968	-3.8	8.4	10.0	5.1	11.1	24.2	17.7	15.2	-3.8	9.1	22.0	8.6	15.6	16.0	7.6	-2.8
969	-4.0	17.4	18.4	14.1	13.3	13.7	24.2	20.0	-2.8	23.2	19.5	24.5	7.5	7.4	5.6	-2.6
970	-0.7	5.6	23.8	5.6	11.9	11.1	22.4	24.6	-8.0	23.7	19.3	7.3	17.2	5.7	17.0	-2.5
971	-0.9	19.5	13.4	20.6	8.5	12.6	16.8	24.5	-9.5	20.5	16.2	20.4	16.5	11.2	8.6	-2.8
972	-0.3	9.2	21.1	24.5	5.8	12.7	12.8	16.6	-3.3	5.3	7.7	18.7	20.3	7.0	8.2	-0.9
973	-4.7	24.6	6.7	5.3	12.1	25.0	18.0	21.1	-0.9	5.3	18.9	17.0	20.0	22.2	23.5	-3.1
974	-3.9	18.4	8.5	21.8	14.9	19.1	24.4	16.5	-3.6	23.1	24.1	5.4	8.5	14.8	14.7	-2.4
975	-2.4	21.0	16.0	23.8	13.9	21.3	22.5	11.0	-9.1	22.9	20.0	19.5	21.6	7.1	15.4	-4.0

mission	valley loads for cycle #															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
976	-4.3	16.2	7.9	15.2	23.7	22.5	13.2	20.9	0.0	18.3	16.5	23.7	9.7	9.8	20.8	-0.9
977	-4.0	13.8	5.3	15.6	23.8	11.5	14.6	10.9	-4.5	19.2	8.0	19.7	7.6	13.6	19.9	-4.7
978	-1.5	6.3	18.8	12.7	11.8	11.1	24.1	24.2	-6.0	24.5	24.8	22.2	20.6	19.5	20.9	-3.5
979	-4.7	9.6	12.0	9.7	11.4	21.2	22.7	12.0	-0.7	7.3	8.5	19.4	23.1	10.0	15.7	-0.2
980	-3.1	9.4	19.4	8.1	10.5	20.5	12.7	21.1	-8.7	24.4	9.8	20.9	17.6	22.8	22.1	-1.9
981	-2.6	12.3	18.7	17.4	21.9	22.4	12.3	23.0	-6.6	23.3	21.9	15.1	20.0	15.2	5.9	-1.6
982	-3.7	16.8	8.0	5.9	11.5	10.5	14.3	21.9	-9.5	9.5	19.7	19.4	7.1	15.8	20.5	-0.8
983	-0.9	13.7	17.9	9.8	21.6	11.8	21.5	24.7	-7.3	20.9	9.8	5.8	8.6	7.7	8.3	-0.7
984	-1.2	5.5	6.3	7.6	12.5	20.0	12.4	10.2	-7.8	25.0	6.3	6.8	16.3	8.4	12.4	-1.6
985	-1.2	11.3	5.6	16.5	23.5	22.9	22.2	20.7	-7.5	21.9	23.3	23.0	7.2	21.6	17.8	-3.2
986	-2.5	20.0	12.7	11.0	21.0	23.5	21.9	20.4	-3.1	24.4	9.4	23.8	20.7	23.1	15.7	-3.0
987	0.0	19.5	10.3	10.2	23.3	24.7	22.1	20.6	-5.2	22.9	19.7	22.5	23.3	9.1	6.9	-1.2
988	-3.7	17.3	15.3	15.5	21.1	25.0	21.6	22.8	-0.1	21.6	20.0	17.7	5.7	15.5	23.9	-0.9
989	-2.2	13.7	16.1	10.9	24.7	20.5	23.1	23.1	-0.4	15.6	17.6	9.8	17.8	20.2	9.2	-3.6
990	-0.6	10.4	14.3	16.9	23.2	22.4	24.2	21.9	-1.7	5.0	20.9	20.1	8.1	24.7	21.3	-3.9
991	-3.3	10.6	12.4	19.5	24.4	20.4	22.9	21.8	-7.9	17.6	8.6	21.9	21.6	15.3	24.3	-4.2
992	-3.1	18.4	18.6	12.0	22.4	23.9	20.7	21.0	-9.7	9.5	20.2	17.8	22.0	6.2	19.5	-2.0
993	-4.6	10.0	13.3	13.5	21.3	24.3	22.1	24.2	-9.3	23.4	18.4	6.7	7.5	20.8	6.5	-4.1
994	-2.1	11.0	10.9	17.6	22.9	20.0	23.7	23.6	-2.7	24.8	6.5	16.1	23.9	8.4	21.6	-0.3
995	-1.2	13.3	18.6	18.3	23.2	24.0	20.6	22.3	-4.7	9.2	23.0	21.8	22.1	16.5	16.2	-4.4
996	-2.0	11.4	14.0	18.1	21.6	24.5	24.0	24.3	-4.8	19.3	17.2	6.3	7.6	23.2	23.5	-4.5
997	-0.6	11.6	18.3	19.3	23.5	24.0	22.0	20.9	-2.7	20.5	23.3	24.7	15.9	22.0	20.6	-4.5
998	-0.6	15.6	17.2	15.0	22.3	22.1	21.2	21.1	-5.0	23.9	17.5	8.7	9.7	23.1	5.1	-4.6
999	-0.4	10.4	15.3	17.5	24.6	21.7	24.2	21.0	-4.1	15.4	18.9	23.7	6.2	21.4	24.7	-4.6
1000	-3.8	15.3	19.6	18.3	21.5	22.1	23.0	22.0	-2.1	19.9	18.7	5.6	7.5	24.5	22.5	-2.0

APPENDIX D

AEROSPACE VEHICLE LOAD AND TEMPERATURE SPECTRUM

The aerospace vehicle spectrum contains 100 missions. The missions are grouped in pairs containing a total of 319 load cycles and lasting 1 hour. The temperature profile for each mission pair remains the same. The maximum peak load in each mission is the only value that changes. These peak loads occur at cycle numbers 106 and 216 (load steps 8 and 19) in each mission pair.

The load spectrum was designed such that its exceedance curve matches the exceedance curve of a transport vehicle. The load-time history presented below is for 1 flight hour. The test spectrum block consists of 50 flight hours (100 missions). Each hour is identical to the one shown, except the maximum loads in each mission vary between 72.0 percent and 100.0 percent of limit load.

The full spectrum is listed for the first mission pair. Maximum peak loads are then listed for all 100 missions in terms of percent test load.

2 missions - 60 minutes (319 load cycles)

Mission 1

Step #	Peak (%)	Valley (%)	IN 718 # of cycles	6-2-4-2 Ti		Cycle Time (sec)	Total Time (sec)
				Temp. (F)	Temp. (F)		
1	71.8	-20.0	1	360.0	300.0	120.00	120.00
2	74.1	50.0	1	960.0	800.0	120.00	240.00
3	45.2	40.0	50	1080.0	900.0	3.60	420.00
4	0.0	0.0	1	300.0	250.0	180.00	600.00
5	45.2	40.0	50	1080.0	900.0	3.60	780.00
6	72.3	46.0	1	1200.0	1000.0	120.00	900.00
7	74.1	50.0	1	1200.0	1000.0	36.00	936.00
8	92.0	50.0	1	1200.0	1000.0	36.00	972.00
9	74.1	50.0	1	1200.0	1000.0	36.00	1008.00
10	72.3	46.0	1	1200.0	1000.0	60.00	1068.00
11	45.2	40.0	50	1080.0	900.0	3.84	1260.00
12	0.0	0.0	1	300.0	250.0	180.00	1440.00
13	45.2	40.0	50	1080.0	900.0	3.84	1632.00
14	72.3	-20.0	1	840.0	700.0	240.00	1872.00

Mission 2

Step #

15	71.8	-20.0	1	360.0	300.0	120.00	1992.00
16	74.1	50.0	2	960.0	800.0	150.00	2292.00
17	72.3	46.0	1	840.0	700.0	480.00	2772.00
18	74.1	50.0	1	1200.0	1000.0	36.00	2808.00
19	78.9	50.0	1	1200.0	1000.0	36.00	2844.00
20	74.1	50.0	1	1200.0	1000.0	36.00	2880.00
21	72.3	46.0	1	1200.0	1000.0	120.00	3000.00
22	45.2	40.0	100	1080.0	900.0	3.60	3360.00
23	72.3	-20.0	1	840.0	700.0	240.00	3600.00

Figure D-1. Table of Peak and Valley Loads for the First and Second Aerospace Vehicle Missions

mission	peak	mission	peak	mission	peak	mission	peak
1	92.0	26	78.9	51	82.0	76	87.0
2	78.9	27	78.9	52	82.0	77	78.9
3	78.9	28	89.0	53	78.9	78	78.9
4	78.9	29	78.9	54	89.0	79	78.9
5	78.9	30	78.9	55	91.0	80	85.0
6	78.9	31	78.9	56	97.0	81	85.0
7	100.0	32	90.0	57	78.9	82	88.0
8	83.0	33	81.0	58	78.9	83	78.9
9	85.0	34	78.9	59	78.9	84	78.9
10	82.0	35	78.9	60	81.0	85	89.0
11	81.0	36	87.0	61	94.0	86	83.0
12	78.9	37	87.0	62	78.9	87	84.0
13	84.0	38	78.9	63	78.9	88	78.9
14	87.0	39	95.0	64	78.9	89	81.0
15	78.9	40	86.0	65	78.9	90	83.0
16	89.0	41	78.9	66	98.0	91	78.9
17	96.0	42	78.9	67	88.0	92	78.9
18	78.9	43	78.9	68	86.0	93	78.9
19	78.9	44	83.0	69	78.9	94	78.9
20	89.0	45	88.0	70	78.9	95	88.0
21	78.9	46	78.9	71	78.9	96	84.0
22	88.0	47	78.9	72	78.9	97	78.9
23	78.9	48	78.9	73	86.0	98	85.0
24	86.0	49	78.9	74	78.9	99	78.9
25	78.9	50	93.0	75	86.0	100	78.9

Figure D-2. Table of Mission Peak Loads for Aerospace Vehicle Spectrum